Mr JORDAN
LONDON
1886

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## NOTICE.

## RULES 1886-87.

ATTENTION IS DIRECTED TO ALTERATIONS & AMENDMENTS which have been made in the Rules, as follows, viz.—

### IRON SHIPS.

**SEE PAGES, 18, 19, 70 & 71:—**

*Testing of Deep Tanks at Special Surveys Nos. 1, 2 and 3, and Examination of Plating and Side Lights at Special Survey No. 3.*

### STEAM SHIPS.

**SEE PAGES, 52, 125 & 142:—**

*Boilers of Steam Ships, Test of Steel for Boiler Plates.*

### TABLE No. 22, FOR CHAINS & ANCHORS.

*Amended Foot Note for Chains & Anchors of Steam Vessels.*

**For further particulars of alterations in the Rules, see Notices 576 and 597, printed in the Appendix to the Rules.**

By order of the Committee,

BERNARD WAYMOUTH,

*Secretary.*

2, *White Lion Court, Cornhill,*

1*st July*, 1886.

Lloyd's Register
Marine Technical Library
London
Marine Data Systems
Date:
28/08/02
837 Catalogue No.:

Rebound 28/08/02

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

[ESTABLISHED 1834.]

## YACHT REGISTER.

1886—87.

NOTICE IS HEREBY GIVEN that this Society's Yacht Register for the year 1886—87, was issued on the 1st May.

It contains, in addition to the Names, Class, and other useful information relating to Yachts classed by the Society, the Names, Dimensions, &c., of all British and Foreign Yachts, the particulars of which are known; also in an Appendix, a list of the various Yacht Clubs and Illustrations of their respective Flags, an Index of Signal Letters, a List of Yachts which have had Names changed, a list of Yachts arranged according to their Tonnage, an Alphabetical List of the Names and addresses of Yacht Owners so far as they can be ascertained, and a List of Builders and Designers, with the Names of Yachts Built or Designed by them.

The Society's rules and suggested scantlings for the Building of Iron, Wood, and Composite Yachts, intended for Classification are comprised in the volume.

The terms of Subscription are half a guinea per copy for individuals or firms; and for Yacht Clubs, Marine Assurance Companies, and other public bodies, not less than two Guineas per annum, for which two copies of the work will be supplied.

By order of the Committee,

B. WAYMOUTH,

*Secretary.*

2, *White Lion Court, Cornhill, London, E.C.*
*June*, 1886.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## ESTABLISHED 1834.

### REGISTER BOOK.

THE REGISTER BOOK is published annually on the 1st July. It contains the names, &c., of *all* vessels of 100 tons and upwards registered in the United Kingdom, and of many ships of large tonnage owned abroad.

In the Appendix will be found a list of Owners of Ships recorded in the Register Book, also a list of Dry Docks, Floating Docks, Pontoons, Patent Slipways, &c., at the principal Ports in the World, also Wet Docks, Quays, &c., in the United Kingdom.

A list is also printed in the Appendix of the Members of Lloyd's, and of the Agents to Lloyd's.

The annual subscription of individuals or Firms for the Register Book is £3 3s.

The Register Books in London are (unless otherwise arranged) periodically posted by type, with additions and corrections throughout the year, for which an additional charge of £1 1s. is made.

Supplements are supplied to subscribers in the country and those resident abroad, also for Register Books not posted as above.

From the number of alterations and additions constantly returned to this office, it is necessary that the Register Books should be posted every week; it is therefore requested that Subscribers whose Books are posted, will be particular in sending them to this office for that purpose.

It is particularly requested that subscribers of Posted Books, *leaving town*, will direct their Books to be sent to the office, where they will be kept regularly posted during their absence.

Parties discovering any errors, are requested to communicate the same to the Secretary, in order that immediate notice may be taken thereof.

N.B.—The Subscription is due on the delivery of the Book.

### CLASSIFICATION OF IRON AND STEEL SHIPS BY LLOYD'S REGISTER.

IRON SHIPS are classed by the Society *A1, A1, A1, and A1, also A1 with a numeral prefixed, thus—100A1, 90A1, and 80A1, and retain their characters so long as, on careful annual surveys and periodical Special Surveys, they are found to be in a fit and efficient condition to carry dry and perishable cargoes to and from all parts of the world.

The Characters 100A1 and 90A1 and 80A1 denote vessels that have been built in accordance with, or equal to the Rules, and Tables G 1, G 2, G 3, G 4, G 5 and G 6 attached to the Rules.

### *CLASSIFICATION OF THE UNDERWRITERS' REGISTRY (now Amalgamated with Lloyd's Register).*

**A1*, A1*** . . . Characters of Iron or Steel Vessels built in excess of the Rules of the Underwriters' Registry and of extra quality of Iron.

**A1*, A1*; A1, A1; A, A** Characters of Iron, Steel or Composite Vessels built according to the Rules. Vessels classed in Red have been built under the inspection of the Surveyors to the Liverpool Registry. The figure 1 or 2 affixed to Symbols of Classification signifies the Character of Equipment.

### CLASSIFICATION OF WOOD SHIPS.

WOOD SHIPS are classed A 1 as a first-class for a term of Years, subject to occasional or annual surveys when practicable, also to *half-time or intermediate* Special Surveys. They are eligible for Continuation or Restoration of the Character A 1 for further periods upon Special Surveys provided in the Rules.

WOOD SHIPS are also classed A 1 in Red.—This also is a Class of Vessels fit for the safe conveyance of dry and perishable goods *to and from all parts of the world*. They are subject to annual survey, and to the half-time survey prescribed in the Rules.

WOOD SHIPS are likewise classed Æ, for the conveyance of dry and perishable goods on *shorter voyages*, and for the conveyance of cargoes *not* in their nature subject to sea damage *on any voyage*. They must be submitted to annual survey, and to Special Survey within periods not exceeding *four* years.

WOOD SHIPS are also classed E, for the conveyance of cargoes not subject to sea damage *on any voyage*, They must be submitted to annual survey, and to Special Survey within periods not exceeding *three* years.

Provision is made in the Rules for the Classification of Composite Ships.

All vessels are required to be surveyed periodically. The *date of Survey* only certifies to their state of efficiency *at that time*.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.

By order of the Committee,

BERNARD WAYMOUTH,
*Secretary.*

*No. 2, White Lion Court, Cornhill,*
*London, 1st July,* 1886.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ESTABLISHED 1834.

REGISTER BOOK.

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In the Appendix will be found a list of Owners of Ships recorded in the Register Book, also a list of Dry Docks, Floating Docks, Patent Slipways, &c., of the principal Ports in the World, also Wet Docks, Quays, &c., in the United Kingdom.

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Parties discovering errors, are requested to communicate the same to the Secretary, in order that immediate notice may be taken thereof.

N.B.—The Subscription is due on the delivery of the Book.

CLASSIFICATION OF IRON AND STEEL SHIPS BY LLOYD'S REGISTER.

IRON SHIPS are classed by the Society $\overset{*}{\triangle}$1, $\triangle$1, $\overset{*}{\triangle}$A1, and $\triangle$A1, also $\triangle$1 with a numeral prefixed, thus—100$\triangle$1, 90$\triangle$1, and 80$\triangle$1, and retain their characters so long as, on careful annual surveys and periodical Special Surveys, they are found to be in a fit and efficient condition to carry dry and perishable cargoes to and from all parts of the world.

The Characters 100$\triangle$1 and 90$\triangle$1 and 80$\triangle$1 denote vessels that have been built in accordance with, or equal to the Rules, and Tables O 1; O 2, O 3, O 4, O 5 and O 6 attached to the Rules.

CLASSIFICATION OF THE UNDERWRITERS' REGISTRY (now Amalgamated with Lloyd's Register).

A1*, A1; Characters of Iron or Steel Vessels built in excess of the Rules of the Underwriters' Registry and of extra quality of Iron.

A1*, A1*; A1, A1; A, Characters of Iron, Steel or Composite Vessels built according to the Rules. Vessels classed as A1 have been built under the inspection of the Surveyors to the Liverpool Registry.

The figure 1 or 2 affixed to Symbols of Classification signifies the Character of Equipment.

CLASSIFICATION OF WOOD SHIPS.

WOOD SHIPS are classed A 1 as a first-class for a term of Years, subject to occasional or annual surveys when practicable, also to Any-Time or Intervening Special Surveys. They are eligible for Continuation or Restoration of the Character A 1 for further periods upon Special Surveys provided in the Rules.

WOOD SHIPS are also classed A 1 in Red.—This also is a Class of Vessels fit for the safe conveyance of dry and perishable goods to and from all parts of the world. That are subject to annual survey, and to the half-time survey prescribed in the Rules.

WOOD SHIPS are likewise classed ✠, for the conveyance of dry and perishable goods on short voyages, and for the conveyance of cargoes not in their nature subject to sea damage on any voyage. They must be submitted to annual survey, and to Special Survey within periods not exceeding four years.

WOOD SHIPS are also classed ✠, for the conveyance of cargoes not subject to sea damage on any voyage. They must be submitted to annual survey, and to Special Survey within periods not exceeding three years.

Provision is made in the Rules for the Classification of Composite Ships.

All vessels are required to be surveyed periodically. The date of Survey only certifies to their state of efficiency at that time.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving Notice or Intimation of Survey required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.

By order of the Committee,

BERNARD WAYMOUTH,
Secretary.

No. 2, White Lion Court, Cornhill,
London, 1st July, 1886.

# LLOYD'S REGISTER

OF

# BRITISH AND FOREIGN

# SHIPPING.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

UNITED WITH THE

# UNDERWRITERS' REGISTRY FOR IRON VESSELS IN 1885.

ESTABLISHED 1834.

## NOTICE.

The Register, which is printed solely for the use of Subscribers, now contains the respective characters and full particulars of Vessels which are classed by LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING, and of those which are classed by the UNDERWRITERS' REGISTRY FOR IRON VESSELS.

It also contains the Names, Dimensions, and other useful particulars of *all* Vessels of 100 tons and upwards registered in the United Kingdom, some of which, although not classed in this Society's Register, may be classed elsewhere.

The conditions regulating the Classification of Vessels in the Register are contained in the Rules.

The Key to the Register precedes the List of Vessels.

# LLOYD'S REGISTER

OF

# BRITISH AND FOREIGN SHIPPING.

## ESTABLISHED 1834.

UNITED WITH THE

## UNDERWRITERS' REGISTRY FOR IRON VESSELS IN 1885.

*From 1st July, 1886, to the 30th June, 1887.*

The REGISTER,—which is printed solely for the information of Merchants, Shipowners, Underwriters, and others, being Subscribers or Members,—contains, in addition to the names, class, and other useful particulars relating to vessels classed by the Society, and those classed by the Underwriters' Registry for Iron Vessels, the names, dimensions, &c., of *all* vessels of 100 tons and upwards registered in the United Kingdom, some of which, although not classed by the Society, may be classed elsewhere.

The conditions regulating the classification of vessels in the REGISTER are contained in the Society's Rules.

The KEY to the REGISTER precedes the List of Vessels.




OFFICE: 2, WHITE LION COURT, CORNHILL, LONDON.

1886.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

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OFFICE: 2, WHITE LION COURT, CORNHILL, LONDON.

1886.

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# COMMITTEE OF MANAGEMENT.

## 1886-1887.

WILLIAM HENRY TINDALL, Esq., *Chairman.*
MICHAEL WILLS, Esq., *Deputy-Chairman.*
THOMAS B. WALKER, Esq., *Chairman of the Sub-Committees of Classification.*

### MEMBERS ELECTED IN LONDON.

H. J. BRISTOW, Esq.
JOHN CORRY, Esq.
SOLOMON I. DACOSTA, Esq.
JAMES DIXON, Esq.
GEORGE DUNCAN, Esq.
JOHN GLOVER, Esq.
HENRY GREEN, Esq., M.P.
GEORGE LIDGETT, Esq.
H. E. MONTGOMERIE, Esq.
FREDERIC B. B. NATUSCH, Esq.
HENRY NIXON, Esq.
JAMES PARK, Esq.
A. O. ROBINSON, Esq.
WM. FREDERICK SAUNDERS, Esq.
WILLIAM STRANG, Esq.
CHARLES R. TATHAM, Esq.
JOHN HENRY TOD, Esq.
GEORGE DORMAN TYSER, Esq.
LEONARD C. WAKEFIELD, Esq.
ARTHUR OATES WILKINSON, Esq.
WILLIAM YOUNG, Esq.

Right Hon. GEORGE J. GOSCHEN, M.P., *Chairman of the Committee of Lloyd's.*
THOMAS SCRUTTON, Esq., *Chairman of the General Shipowners' Society.*

### MEMBERS ELECTED AT THE PRINCIPAL OUTPORTS.

FOR LIVERPOOL.

J. H. WORTHINGTON, Esq., *Chairman of the Liverpool Committee.*
SAMUEL CROSS, Esq., *Deputy-Chairman ditto.*

JOHN S. ALLEN, Esq.
ROBERT NORRIS DALE, Esq.
ALFRED HOLT, Esq
DONALD KENNEDY, Esq.
JOHN RANKIN, Esq.
THOMAS R. SHALLCROSS, Esq.
H. T. WALLACE, Esq.
JOHN WILLIAMSON, Esq.

GLASGOW { WILLIAM ADAMSON, Esq. / WALTER EASTON, Esq. / THOMAS LOW, Esq. / JAMES MCGREGOR, Esq.

SUNDERLAND { RALPH M. HUDSON, Esq. / JAMES LAING, Esq.

HARTLEPOOL DISTRICT { WILLIAM GRAY, Esq. / JOHN HALL, Esq.

BRISTOL—JOHN EVANS, Esq.

LEITH DISTRICT—JOHN WARRACK, Esq.

GREENOCK—DUGALD MACDOUGALL, Esq.

TYNE DISTRICT { R. S. DONKIN, Esq., M.P. / J. D. MILBURN, Esq. / E. H. WATTS, Esq.

CARDIFF DISTRICT—Col. E. S. HILL, C.B.

HULL—HENRY J. ATKINSON, Esq.

### TRUSTEES.

HENRY NIXON, Esq.
GEORGE DUNCAN, Esq.
WILLIAM HENRY TINDALL, Esq.
JOHN HENRY TOD, Esq.
THOMAS B. WALKER, Esq.
MICHAEL WILLS, Esq.

### BANKERS.

THE NATIONAL PROVINCIAL BANK OF ENGLAND (*Lim.*) and BANK OF ENGLAND.

### SECRETARY.

BERNARD WAYMOUTH, Esq.

### ASSISTANT SECRETARY.

RICHARD GILLESPIE, Esq.

*No. 2, White Lion Court, Cornhill, London,*
*1st July*, 1886.

# LIVERPOOL BRANCH.

## 1886-1887.

---

### COMMITTEE.

J. H. Worthington, Esq., *Chairman.*

Samuel Cross, Esq., *Deputy-Chairman.*

John S. Allen, Esq.
Robert Norris Dale, Esq.
David Fernie, Esq.
Henry H. Grayson, Esq.
Alfred Holt, Esq.
David Jardine, Esq.
Donald Kennedy, Esq.
James Poole, Esq.
John Rankin, Esq.
Thomas R. Shallcross, Esq.
Thomas James Storey, Esq.
C. B. Vallance, Esq.
H. T. Wallace, Esq.
John Williamson, Esq.

---

### MEMBER OF THE COMMITTEE EX-OFFICIO.

Thomas B. Royden, Esq., M.P., *Chairman of the Shipbuilders' Association.*

---

### BANKERS.

The National Provincial Bank of England (*Lim.*).

---

### SECRETARY.

John Frederick Light, Esq.

*Office*, 12, *Oriel Chambers*, *Liverpool*,
1*st July*, 1886.

# LIVERPOOL BRANCH.

## 1886-1887.

### COMMITTEE.

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John Williamson, Esq.

### MEMBER OF THE COMMITTEE EX-OFFICIO.

Thomas B. Royden, Esq., M.P., *Chairman of the Shipbuilders' Association.*

### BANKERS.

The National Provincial Bank of England (*Lim.*).

### SECRETARY.

John Frederick Light, Esq.

*Office*, 12, *Oriel Chambers, Liverpool,*
1*st July*, 1886.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## SURVEYORS.

THE SURVEYORS AT THE FOLLOWING PORTS ARE EXCLUSIVELY THE OFFICERS OF THE SOCIETY, AND ARE NOT PERMITTED TO ENGAGE IN ANY OTHER BUSINESS OR EMPLOYMENT WHATSOEVER.

| | | |
|---|---|---|
| LONDON | | William C. Davey, *Principal Surveyor for London District.* |
| | Benjamin Martell, Esq., *Chief Surveyor of Lloyd's Register.* | Jenkins, Philip. |
| | Harry J. Cornish, Thomas Edwards, *Assistants to Chief Surveyor.* | Jordan, C. H.<br>Martindale, Senhouse<br>Miles, John W. |
| | William Parker, Esq., *Chief Engineer Surveyor of Lloyd's Reg.* | Read, Thomas C. |
| | James T. Milton, David Purves, *Assistants to Chief Engineer Surveyor.* | Tierney, E. J.<br>Truscott, James H.<br>Warren, Thomas S.<br>Wilson, Allison B. |
| | *Engineer Surveyors* | Stromeyer, Charles E.<br>Wilkinson, George E. |
| | *Draughtsman* | Hunter, David S. |
| ABERDEEN | *with Banff, Peterhead, and Fraserburgh ... ... ...*<br>*Ship and Engineer Surveyor ... ... ... ...*<br>*(Office, 29, Regent Quay, Aberdeen)* | Heck, John H. |
| BANGOR | *with Carnarvon and Holyhead (Office, 5, Glan Dwr Terrace)* | Devonald, Thomas |
| BARROW | *and Ulverstone ... ... ... (Office, 8, Strand, Barrow)* | Buchanan, Charles<br>Harrison, George |
| | *Engineer Surveyor for Barrow, Whitehaven, &c. ...*<br>*(Office, 8, Strand, Barrow)* | Ritchie, Duncan |
| BELFAST | *... ... ... (Office, Victoria Chambers, Waring Street)*<br>*Ship and Engineer Surveyor... ... ... ...* | Turpin, James<br>Maxton, James |
| BIDEFORD | *Barnstaple, and Appledore ... ... (residing at Bideford)* | Fittock, Charles |
| BRISTOL | *Gloucester, and Bridgewater ... ... ... ...*<br>*Ship and Engineer Surveyor ... ... ... ...*<br>*(Office, 53, Queen Square, Bristol)* | Coomber, R. W. |

SURVEYORS—*continued.*

| | | |
|---|---|---|
| CARDIFF ... ... ... | (*Office*, 4, *Bute Crescent, Cardiff*) | Henry T. Tyrrell, *Principal Surveyor.*<br>Rule, J. G. G. |
| | *Ship and Engineer Surveyors for Cardiff; also Engineer Surveyors for the Swansea District* ... ... ... | Keydell, A. E.<br>Mancor, J. H. |
| CHANNEL ISLANDS ... ... ... ... | (*residing at Jersey*) | Chinneck, T. J. |
| DUBLIN ... ... ... ... | (*Office*, 153, *Clonciffe Road*) | Mugford, John |
| DUNDEE | *with Arbroath, Montrose, and Perth* (*Office*, 54, *Commercial Street, Dundee*) | Cooper, George P. |
| | *Ship and Engineer Surveyor for Dundee* ... ... | Sturrock, John |
| FALMOUTH | *with all Ports on the coast between Looe and Padstow, including Fowey, Helston, Penzance, St. Ives, Hayle, Portreath, and New Quay; also the Scilly Islands* (*Office*, 2, *Park Terrace, Falmouth*) | Sandry, T. H. |
| | *Engineer Surveyor for Falmouth and Plymouth Districts* (*residing at Falmouth*) | Moreton, Lawrence |
| GLASGOW | *with Dumbarton* (*Office*, 36, *Oswald Street, Glasgow*) | William T. Mumford, *Principal Surveyor.*<br>Burney, Charles E.<br>Courtier-Dutton, W. T<br>Dodd, Thomas J.<br>Dove, Herbert W.<br>Edwards, Charles<br>Fowling, Charles<br>Hand, Henry<br>Roberts, J. T.<br>Stanbury, George<br>Thomson, Joseph |
| | *Engineer Surveyors for Glasgow District* ... ... | Mollison, James<br>Robson, Walter E. |
| | *Ship and Engineer Surveyors*... ... ... ... | Hindmarsh, G. L.<br>Sanderson, John |
| | *Inspector of Forgings for the Clyde District*... ... | Newcomb, George |
| GREENOCK | *with Rothesay, Ardrossan, Troon, Irvine, Ayr, Girvan, and Fairlie* (*Office*, 13, *Hamilton Street, Greenock*) | Christopher Besant, *Principal Surveyor.*<br>Dawkins, John<br>Thearle, S. J. P. |
| | *Engineer Surveyor for Greenock District* ... ... | Heron, Andrew C. |
| HARTLEPOOL, | *Stockton, and Middlesbrough, also Whitby and Scarborough* (*Office, Dock Office Buildings, Victoria Terrace, West Hartlepool*) | Charles Davidson, *Principal Surveyor.*<br>Andrews, William<br>Phillips, Thomas<br>Wilkinson, Henri<br>Williams, H. M. |
| | *Engineer Surveyor for the Tees District* ... ... | Stoddart, J. E. |

SURVEYORS—*continued.*

| | | |
|---|---|---|
| | *Ship and Engineer Surveyor* ... ... ... ... | Austin, W. R. |
| HULL | *Gainsborough, Goole, Selby, Grimsby, Burton Stather, and Knottingley* (*Office, Bank Chambers, Land of Green Ginger, Hull*) | McNeil, James |
| | *Ship and Engineer Surveyor for the Hull District* ... | Innes, James |
| IPSWICH | ... ... ... (*Address*, 35, *Lower Orwell Street*) | Robertson, Ebenezer J. |
| LEITH | *and Ports in the Frith of Forth, with Berwick-upon-Tweed* (*Office*, 56, *Constitution Street, Leith*) | Paulsen, William |
| | *Ship and Engineer Surveyor* ... ... ... ... | Darling, William J. |
| LIVERPOOL | *with Lancaster and all intermediate places, the River Mersey, Chester, and River Dee; also the Isle of Man* ... ... (*Office*, 12, *Oriel Chambers, Liverpool*) | John F. Light, *Secretary and Principal Surveyor.*<br>Champness, Edward C.<br>Lawrence, John<br>Moverly, William<br>Wheeler, Edward C. |
| | *Engineer Surveyors for the Liverpool District* ... | McGregor, Peter<br>Milner, G. A. |
| | *Ship and Engineer Surveyor* ... ... ... ... | Hamilton, Andrew K. |
| MILFORD HAVEN | *Pembroke, and Tenby, with a district extending as far as Newquay inclusive* ... ... ... ... ... (*residing at Milford Haven*) | Warlow, James D. |
| | *Engineer Surveyor* (*not the exclusive officer of the Society*) (*Address*, 15, *Neyland Terrace, Neyland*) | Harris, W. |
| NEWCASTLE-ON-TYNE | *with North and South Shields; also Blyth and Hartley* (*Office*, 3, *St. Nicholas' Buildings, Newcastle*) | Henry J. Boolds, *Principal Surveyor.*<br>Cooke, Thomas H.<br>Mares, George R.<br>Scullard, J. W.<br>Sharpe, W. L.<br>Shilston, Thomas<br>Sibun, James<br>Skentelbery, C.<br>Williamson, Robert |
| | *Engineer Surveyors for the Tyne District* ... ... | Brockat, John<br>Hirst, Richard<br>Walliker, J. F. |
| NEWPORT, MON. | *with Chepstow, Ship and Engineer Surveyor for the Newport District* .. ... ... ... ... (*Office*, 30, *Dock Street, Newport, Mon.*) | Kendall, George |
| PLYMOUTH | *Ship and Engineer Surveyor* ... (*Office*, 14, *Exchange*) | Taylor, J. E. |
| PORTMADOC | *and Barmouth, with a district extending as far as, but not including, Newquay* ... (*residing at Portmadoc*) | John, William |
| QUEENSTOWN | *with Cork, Kinsale, and Limerick* ... ... ... ... (*Office*, 1, *King's Terrace, Queenstown*) | Head, J. T. |

SURVEYORS—*continued.*

| | | |
|---|---|---|
| SOUTHAMPTON | *and South Coast from Shoreham to Bridport inclusive, also the Isle of Wight ... ... ... ...* (*Office*, 9, *Oriental Place, Southampton*) | Sinnette, James L. |
| | *Engineer Surveyor ... ... ... ... ...* | Stevens, John B. |
| SUNDERLAND | *and Seaham* (*Office*, 56, *John Street, Sunderland*) | Richard J. Reed. *Principal Surveyor.*<br>Bath, William<br>Johnstone, William<br>Keen, Joseph<br>Rutherford, John<br>Williams, Jesse |
| | *Engineer Surveyors for the Wear District ... ...* | Allison, William<br>Salmon, Patrick |
| | *Inspector of Forgings for the North-East Coast ... ...* | Cameron, Hugh |
| SWANSEA | *with Neath and Llanelly ... ... ... ... ...* (*Office, Adelaide Chambers, Adelaide Street, Swansea*) | Ashton, Thomas |
| WHITEHAVEN, | *Workington, Harrington, and Maryport, with Dumfries and Annan ... ...* (*residing at Whitehaven*) | House, Thomas J. |

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THE SURVEYORS AT THE FOLLOWING PORTS DO NOT HOLD APPOINTMENTS AS THE EXCLUSIVE SERVANTS OF THE SOCIETY.

| | | |
|---|---|---|
| GUERNSEY | ... ... ... ... ... ... ... ... | Sullock, George T. |
| LYNN | *Boston, Wells, and intermediate Ports* (*residing at Lynn*) | Beaumont, William F. |
| ORKNEYS | ... ... ... ... (*residing at Stromness*) | Mowat, James |
| RAMSGATE | *and Margate, with Deal and Dover* (*residing at Ramsgate*) | Jones, Edward |
| SLIGO | ... ... ... ... ... ... ... ... | Pollexfen, William |
| WATERFORD | (*Ship and Engineer Surveyor*)... ... ... ... | Horn, Andrew |
| WEXFORD | ... ... ... ... ... ... ... ... | |

# SURVEYORS.

THE FOLLOWING COLONIAL AND FOREIGN SURVEYORS HAVE BEEN APPOINTED SINCE THE PRINTING OF THE REGISTER BOOK FOR THE YEAR 1886-87.

| | | |
|---|---|---|
| CARTAGENA | *Ship and Engineer Surveyor* ... ... ... ... | Sanchez, José Hernandez. |
| CHERIBON | ... ... ... ... ... ... ... ... | Campbell, C. |
| CHRISTCHURCH, N.Z. | ... ... ... ... ... ... ... ... | Ticehurst, Robert. |
| HUELVA | *Ship and Engineer Surveyor* ... ... ... ... | Langdon, William. |
| LA ROCHELLE | ... ... ... ... ... ... ... ... | Garnier, André Louis. |
| MALAGA | *Ship and Engineer Surveyor* ... ... ... ... | Lappe, Enrique. |
| NAGASAKI AND OSAKA. | *Ship and Engineer Surveyor, and Engineer Surveyor for Yokohama* ... ... ... ... ... | Ellerton, James. |
| NEWCASTLE, N.S.W. | ... ... ... ... ... ... ... ... | Brooks, Thomas. |
| | *Engineer Surveyor* ... ... ... ... ... | Rorison, James. |
| OPORTO | ... ... ... ... ... ... ... ... | Dos Santos, J. M. |
| | *Engineer Surveyor* ... ... ... ... ... | Ennor, Chas. J. |
| PORTLAND, OREGON | ... ... ... ... ... ... ... ... | Pope, George. |
| RIO JANEIRO | *Engineer Surveyor* ... ... ... ... ... | Macfarlane, Daniel. |
| ST. MALO | *Ship and Engineer Surveyor* ... ... ... ... | Gallais, Jean G. |
| SAMARANG | ... ... ... ... ... ... ... ... | Vogel, W. |
| SUEZ | ... ... ... ... ... ... ... ... | Weston, A. R. |
| | *Engineer Surveyor* ... ... ... ... ... | Campbell, J. |
| TAGANROG | *Ship and Engineer Surveyor* ... ... ... ... | Bell, Chas. |
| TORONTO | ... ... ... ... ... .. ... ... | Harbottle, Thos. |

# LIST OF FOREIGN AND COLONIAL SURVEYORSHIPS OF LLOYD'S REGISTER.

THE SURVEYORS AT THE FOLLOWING PORTS DO NOT HOLD APPOINTMENTS AS THE EXCLUSIVE SURVEYORS OF THE SOCIETY, EXCEPTING THOSE AT NEW YORK AND ROTTERDAM.

| | | |
|---|---|---|
| | **RUSSIA.** | |
| CRONSTADT | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Krakow Kanal, No.* 5, *St. Petersburg*) | Wessblad, A. |
| HELSINGFORS | *Ship and Engineer Surveyor* (*Address*, 23, *Brunnspark*) | Kolster, R. |
| ODESSA | ... ... ... ... ... ... ... ... | |
| RIGA | ... ... ... ... ... ... ... ... | Lindemann, C. A. |
| | *Engineer Surveyor* ... ... ... ... ... (*Address, Pychau Dampfsagemühle*) | Hillbring, F. W. |
| SEBASTOPOL | *Ship and Engineer Surveyor* ... ... ... ... | Corry, John E. |
| TAGANROG | ... ... ... ... ... ... ... ... | |
| | **NORWAY.** | |
| ARENDAL | ... ... ... ... ... ... ... ... | |
| BERGEN | *Ship and Engineer Surveyor* ... ... ... ... | Hougland, E. |
| | **SWEDEN.** | |
| CARLSCRONA | ... ... ... ... ... ... ... ... | |
| GEFLE | ... ... ... ... ... ... ... ... | |
| GOTHENBURG | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Lazareltsgatan, No.* 101 *b*) | Möller, Carl Axel |
| | **DENMARK.** | |
| COPENHAGEN | *Ship and Engineer Surveyor* ... ... ... ... (*Address*, 48, *Toldbodvej*) | Kindler, P. Fred |
| | **GERMANY.** | |
| HAMBURG | *with the River Elbe, Ports in Holstein, Lubeck, Rostock, and Stettin* (*Office, Steinhöft, No.* 3, *Hamburg*) | Padderatz, Emil |
| | *Engineer Surveyor for the Hamburg District*... ... | Berendt, M. |
| | *Assistant Ship and Engineer Surveyor at Bremerhaven for the Weser District* ... ... ... ... (*Office, Lloyd Strasse, No. 22*) | Thomsen, F. H. T. |
| | *Assistant Surveyor at Rostock, with a District extending from Lubeck to Elbing* ... ... ... | Cordes, W. |
| MEMEL | ... ... ... ... ... ... ... ... | |

## FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

### Holland.

| | | |
|---|---|---|
| Amsterdam | *with Nieuwdiep and neighbouring Ports* ... ... ... | Ollefen, W. F. D. van |
| | *Ship and Engineer Surveyor for Amsterdam; also Engineer Surveyor for the Ports in Holland* ... | |
| | Mr. van Ollefen is exclusively an officer of Lloyd's Register. | |
| Rotterdam | *with Dordrecht, Schiedam, and surrounding places, also Zeeland* (*Address, Westerhaven, 6, Rotterdam*) | Loos, Jan C. W. |
| Veendam | *with Groningen, Zwolle, Harlingen, Emden, and surrounding places, including Hanover* ... ... ... (*Address, Kerklaan H, 785, Veendam*) | Hazewinkel, H. P. |

### Belgium.

| | | |
|---|---|---|
| Belgium | *also the Ports in the River Scheldt, including Terneuzen and neighbouring Ports, and the Ports on the North Coast of France, as far westward as Boulogne, but not including this place* ... ... ... ... ... (*Office, Rue d'Amsterdam, Antwerp*) | Paasch, Heinrich |
| | *Engineer Surveyor for the Belgium District* ... ... (*residing at Antwerp*) | Demblon, Francis |

### France.

| | | |
|---|---|---|
| Bayonne | ... ... ... ... ... ... ... ... | |
| Bordeaux | ... ... ... (*Address*, 16, *Rue Blanc Dutrouille*) | Vandercruyce, Jules |
| | *Engineer Surveyor* ... ... ... ... ... (*Address*, 108, *Rue du Palais Gallien*) | Donzelle, A. |
| Cette | ... ... ... ... ... ... ... ... | |
| Dieppe | ... ... ... ... ... ... ... ... | |
| Havre | *with a District including Boulogne and Barfleur* ... ... | Le Laidier, A. |
| | *Ship and Engineer Surveyor* ... ... ... ... (*Address*, 25, *Place de l'Hôtel de Ville, Havre*) | |
| La Rochelle | ... ... ... ... ... ... ... ... | |
| Marseilles | *Ship and Engineer Surveyor* (*Address* 5, *Rue Suffren*) | Westerman, Francis |
| Nantes | ... ... ... (*Address*, 8, *Rue de l'Héronniere*) | Guibert, Auguste L. |
| Rochefort | ... ... ... ... ... ... ... ... | |
| St. Malo | ... ... ... ... ... ... ... ... | |

### Spain and Portugal.

| | | |
|---|---|---|
| Alicante | ... ... ... ... ... ... ... ... | |
| Barcelona | *Ship and Engineer Surveyor*... ... ... ... (*Address, Portico Xifré*, 10, 1°) | Browne, J. J. |
| Bilbao | ... ... ... ... ... ... ... ... | De Bareno, German |
| Cadiz | *Ship and Engineer Surveyor* (*Address*, 25, *Aduana*) | Cochrane, James |
| Carthagena | ... ... ... ... ... ... ... ... | |
| Huelva | ... ... ... ... ... ... ... ... | |

## FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

### Spain and Portugal (*continued*).

| | | |
|---|---|---|
| Lisbon | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Rua do Jardin do Tabaco* 33, 22°) | Westwood, J. |
| Malaga | ... ... .. ... ... ... ... ... | |
| Oporto | ... ... ... ... ... ... ... ... | |
| Valencia | ... ... ... ... ... ... ... ... | |

### Gibraltar.

| | | |
|---|---|---|
| Gibraltar | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Government Dock Yard*) | Hook, James |

### Italy and Austria.

| | | |
|---|---|---|
| Ancona | ... ... ... ... ... ... ... ... | Emett, F. G. |
| Genoa | ... ... (*Office, Via S. Luca, No.* 2, *Prima Scala*) | Schiaffino, Francesco |
| | *Engineer Surveyor for Genoa and Leghorn* ... ... (*Address*, 5, *Rue Suffren, Marseilles*) | Westerman, Francis |
| Leghorn | ... ... ... ... ... ... ... ... | Gori, Costantino |
| Messina | ... ... ... ... ... ... ... ... | |
| Naples | ... ... ... ... ... ... ... ... | |
| Palermo | ... ... ... ... ... ... ... ... | |
| Trieste | *with District of the Austro-Hungarian Coast, also Venice and Ancona* (*Office, Piazzo dei Negozianti, No.* 2, *primo piano, Trieste*) | Florio, Elias |
| | *Engineer Surveyor for Trieste District*... ... ... | Schnabl, Frederick |
| | *Assistant Surveyor at Fiume* ... ... ... ... | Bonetich, Ignazio |
| | *Ditto at Lussino* ... ... ... ... | Tarrabocchia, Antonio E. |
| | *Ditto at Venice* ... ... ... ... | Fabro, Matteo |

### Malta.

| | | |
|---|---|---|
| Malta | *Ship and Engineer Surveyor* ... ... ... ... | Hinchcliffe, W. |

### Greece, Turkey, Turkey in Asia, and Roumania.

| | | |
|---|---|---|
| Constantinople | ... ... ... ... ... ... ... ... | Admiral Woods Pasha |
| | *Engineer Surveyor*. ... ... ... ... ... | G. R. Warren. |
| Galatz | ... ... ... ... ... ... ... ... | |
| Salonica | ... ... ... ... ... ... ... ... | |
| Smyrna | ... ... ... ... ... ... ... ... | |
| Syra | ... ... ... ... ... ... ... ... | |

### British North America.

| | | |
|---|---|---|
| Halifax, N.S. | ... ... ... ... ... ... ... ... | Hunter, David |
| Montreal | ... ... ... (*Address, Port Warden's Office*) | Shaw, J. G. |
| Prince Edward Island | ... ... (*residing at Charlotte Town*) | Sloggett, Richard |
| Quebec | *and the River St. Lawrence* ... ... ... ... | Dick, John |
| St. John, N.B. | *with Miramichi and Northern District of New Brunswick* | Coker, Charles R. |

## FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

### United States.

| | | |
|---|---|---|
| New York | *Principal Surveyor for the United States, and Surveyor for the Port and District of New York ... ... (Office, Kemble Building, Whitehall Street, New York* | Congdon, Thomas |

Mr. Congdon is exclusively an Officer of Lloyd's Register.

| | | |
|---|---|---|
| Baltimore ... ... ... ... | *(Office, 11, South Gay Street)* | Sanford, Edward H. |
| | *Engineer Surveyor for Baltimore ... ... ...* | Wells, Richard |
| Boston | *Ship and Engineer Surveyor ... ... ... ... (Office, 24, White Street, East Boston* | Shaw, Oliver L. |
| Charleston ... ... ... ... ... ... ... ... ... | | |
| Philadelphia | *Ship and Engineer Surveyor (Office, 206, Walnut Place)* | Haug, John |
| Portland, Maine ... ... ... ... ... ... ... | | |
| Portland, Oregon ... ... ... ... ... ... ... ... | | |
| San Francisco ... ... ... ... | *(Office, 219, Sansome Street)* | Freeman, J. H. |
| Wilmington, N.C. ... ... ... ... ... ... ... ... | | |

### West Indies.

| | | |
|---|---|---|
| Kingston, Jamaica | *Ship and Engineer Surveyor ... ... ...* | Renwick, C. E |

### South America.

| | | |
|---|---|---|
| Bahia ... ... ... ... ... ... ... ... | | |
| Buenos Ayres | *Ship and Engineer Surveyor ... ... ... ...* | Hunter, W. E. |
| Demerara ... ... ... ... ... ... ... ... ... | | Duncan, Alexander |
| Rio de Janeiro ... ... ... ... ... ... ... ... | | |
| Valparaiso | *Ship and Engineer Surveyor ... ... ... ...* | Ivol, C. C. |

### North Africa.

| | | |
|---|---|---|
| Suez ... ... ... ... ... ... ... ... | | |

### South Africa.

| | | |
|---|---|---|
| Cape Town ... ... ... ... ... ... ... ... | | Anderson, James |
| Port Natal ... ... ... ... ... ... ... ... | | Airth, Alexander |

### Mauritius.

| | | |
|---|---|---|
| Mauritius ... ... ... ... | *(residing at Port Louis)* | Cowin, John |

### India and Burmah.

| | | |
|---|---|---|
| Akyab ... ... ... ... ... ... ... ... | | Brown, G. B. |
| | *Engineer Surveyor ... ... ... ... ...* | McLaggan, C. |
| Bombay ... ... ... ... ... ... ... ... | | Clarke, A. C. |
| | *Engineer Surveyor (Address, Coorla, Bombay)* | Moir, James |
| Calcutta ... ... ... | *(Office, 7, Old Post Office Street)* | McKellar, D. |

## FOREIGN AND COLONIAL SURVEYORSHIPS—*continued.*

### India and Burmah (*continued*).

| | | |
|---|---|---|
| Colombo | ... ... ... ... ... ... ... | |
| Kurrachee | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Persian Gulf Telegraphs, Manora, Kurrachee*) | Hughes, J. |
| Rangoon | ... ... ... ... ... ... ... ... | Winter, R. W. |
| Singapore | ... ... ... ... ... ... ... ... | Fittock, Charles |
| | *Engineer Surveyor* (*Address, Ice Works, River Valley Road*) | Park, Robert |

### East Indian Archipelago.

| | | |
|---|---|---|
| Batavia | *Ship and Engineer Surveyor* ... ... ... ... | Fargie, William |
| | *Assistant Ship Surveyor at* Cheribon, *to act under Mr. Fargie's directions* ... ... ... | |
| Manila | *and Ports in the Philippine Islands* ... ... ... *Ship and Engineer Surveyor* | Sawyer, Frederick H. |
| Samarang | ... ... ... ... ... ... ... ... | |
| Sourabaya | ... ... ... ... ... ... ... ... | Vader, P. |

### China and Japan.

| | | |
|---|---|---|
| Amoy | ... ... ... ... ... ... ... ... | |
| Foochow | ... ... ... ... ... ... ... ... | |
| Hangchow | ... ... ... ... ... ... ... ... | |
| Hong Kong | ... ... ... ... ... ... ... ... | Burnie, Edward |
| | *Engineer Surveyor* (*Address, Lee Yeun Sugar Refinery*) | Johnston, Andrew |
| Nagasaki | ... ... ... ... ... ... ... ... | |
| Osaka | ... ... ... ... ... ... ... ... | |
| Shanghai | ... ... ... ... ... ... ... ... | Warburg, C. G. |
| | *Engineer Surveyor* ... ... ... ... ... | Sonne, H. |
| Yokohama | ... ... ... ... ... ... ... ... ... | Efford, John J. |

### Australia, Tasmania, and New Zealand.

| | | |
|---|---|---|
| Adelaide, S. A. | ... ... ... ... ... ... ... ... | Begg, William |
| Auckland, N.Z. | ... ... ... ... ... ... ... | Clayton, M. T. |
| | *Engineer Surveyor* ... ... ... ... ... | Lodder, W. |
| Brisbane, Queensland | ... ... ... ... ... ... ... | Brown, William B. |
| Christchurch, N.Z. | ... ... ... ... ... ... ... | |
| Dunedin, N.Z. | ... ... ... ... ... ... ... | Russell, James Ure |
| Hobart, Tasmania | ... ... ... ... ... ... ... | Macmillan, Donald |
| Invercargill, N.Z. | ... ... ... ... ... ... ... | |
| Melbourne, Victoria | ... ... ... ... ... ... ... | Watson, William |
| Napier, N.Z. | ... ... ... ... ... ... ... ... | |
| Nelson, N.Z. | ... ... ... ... ... ... ... ... | |
| New Plymouth, N.Z. | ... ... ... ... ... ... ... | |
| Newcastle, N.S.W. | ... ... ... ... ... ... ... | |
| Sydney, N.S.W. | ... ... ... (*Office*, 22, *Bridge Street, Sydney*) | Pockley, Robert F. |
| Wellington, N.Z. | ... ... ... ... ... ... ... | Bendall, William |

# LIST OF SURVEYORSHIPS OF LLOYD'S REGISTER.

## (ALPHABETICALLY ARRANGED).

THE SURVEYORS AT THE PORTS MARKED * ARE EXCLUSIVELY THE OFFICERS OF THE SOCIETY AND ARE NOT PERMITTED TO ENGAGE IN ANY OTHER BUSINESS OR EMPLOYMENT WHATSOEVER.

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| | | |
|---|---|---|
| *LONDON | Benjamin Martell, Esq., *Chief Surveyor of Lloyd's Register* | William C. Davey, *Principal Surveyor for London District.* |
| | Harry J. Cornish, Thomas Edwards, } *Assistants to Chief Surveyor* | Jenkins, Philip<br>Jordan, C. H.<br>Martindale, Senhouse |
| | William Parker, Esq., *Chief Engineer Surveyor of Lloyd's Register.* | Miles, John W.<br>Read, Thomas C. |
| | James T. Milton, David Purves, } *Assistants to Chief Engineer Surveyor* | Tierney, E. J.<br>Truscott, James H.<br>Warren, Thomas S. |
| | *Engineer Surveyors* | Wilson, Allison B.<br>Stromeyer, Charles E.<br>Wilkinson, George E. |
| | *Draughtsman* | Hunter, David S. |
| *ABERDEEN | *Ship and Engineer Surveyor* (*Office*, 29, *Regent Quay*) | Heck, John H. |
| ADELAIDE, S.A. | ... ... ... ... ... ... ... ... | Begg, William |
| AKYAB | ... ... ... ... ... ... ... ... | Brown, G, B. |
| | *Engineer Surveyor* ... ... ... ... ... | McLaggan, C. |
| ALICANTE | ... ... ... ... ... ... ... ... | |
| AMOY | ... ... ... ... ... ... ... ... | |
| *AMSTERDAM | *Ship and Engineer Surveyor for Amsterdam; also Engineer Surveyor for the Ports in Holland* ... | Ollefen, W. F. D. van |
| ANCONA | ... ... ... ... ... ... ... ... | Emett, F. G. |
| ANTWERP | ... ... ... ... (*Office, Rue d'Amsterdam*) | Paasch, Heinrich |
| | *Engineer Surveyor for the Belgium District* ... ... (*residing at Antwerp*) | Demblon, Francis |
| ARENDAL | ... ... ... ... ... ... ... ... | |
| AUCKLAND, N.Z. | ... ... ... ... ... ... ... ... | Clayton, M. T. |
| | *Engineer Surveyor* ... ... ... ... ... | Lodder, W. |
| BAHIA | ... ... ... ... ... ... ... ... | |
| BALTIMORE | ... ... ... ... (*Office*, 11, *South Gay Street*) | Sanford, Edward H. |
| | *Engineer Surveyor* ... ... ... ... ... | Wells, Richard |
| *BANGOR | ... ... ... ...(*Office*, 5, *Glan Dwr Terrace*) | Devonald, Thomas |
| BARCELONA | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Portico Xifré*, 10, 1°) | Browne, J. J. |

| | | |
|---|---|---|
| *Barrow | ... ... ... ... ... (*Office*, 8, *Strand*) | Buchanan, Charles<br>Harrison, George |
| | *Engineer Surveyor* ... ... ... ... ... | Ritchie, Duncan |
| Batavia | *Ship and Engineer Surveyor* ... ... ... ... | Fargie, William |
| Bayonne | ... ... ... ... ... ... ... ... | |
| *Belfast | ... ... (*Office*, *Victoria Chambers*, *Waring Street*) | Turpin, James |
| | *Ship and Engineer Surveyor* ... ... ... ... | Maxton, James |
| Bergen | *Ship and Engineer Surveyor* ... ... ... ... | Hougland, E. |
| *Bideford | ... ... ... ... ... ... ... ... | Fittock, Charles |
| Bilbao ... | ... ... ... ... ... ... ... ... ... | De Bareno, German |
| Bombay ... | ... ... ... ... ... ... ... ... ... | Clarke, A. C. |
| | *Engineer Surveyor* ... (*Address*, *Coorla*, *Bombay*) | Moir, James |
| Bordeaux | ... ... ... (*Address*, 16, *Rue Blanc Dutrouille*) | Vandercruyce, Jules |
| | *Engineer Surveyor* ... ... ... ... ... (*Address*, 108, *Rue du Palais Gallien*) | Donzelle, A. |
| Boston | *Ship and Engineer Surveyor* ... ... ... ... (*Office*, 24, *White Street*, *East Boston*) | Shaw, Oliver L. |
| Bremerhaven (*See* Hamburg). | | |
| Brisbane, Queensland | ... ... ... ... ... ... ... | Brown, William B. |
| *Bristol | *Ship and Engineer Surveyor* ... ... ... ... (*Office*, 53, *Queen's Square*) | Co mber, R. W. |
| Buenos Ayres | *Ship and Engineer Surveyor* ... ... ... ... | Hunter, W. E. |
| Cadiz | *Ship and Engineer Surveyor* (*Address*, 25, *Aduana*) | Cochrane, James |
| Calcutta | ... ... ... (*Office*, 7, *Old Post Office Street*) | McKellar, D. |
| Cape Town | ... ... ... ... ... ... ... ... | Anderson, James |
| *Cardiff | ... ... ... ... (*Office*, 4, *Bute Crescent*) | Henry T. Tyrrell, *Principal Surveyor.*<br>Rule, J. G. G. |
| | *Ship and Engineer Surveyors* ... ... ... ... | Keydell, A. E.<br>Mancor, J. H. |
| Carlscrona | ... ... ... ... ... ... ... ... | |
| Carthagena | ... ... ... ... ... ... ... ... | |
| Cette | ... ... ... ... ... ... ... ... | |
| *Channel Islands | ... ... ... ... ... (*residing at Jersey*) | Chinneck, T. J. |
| Charleston | ... ... ... ... ... ... ... ... | |
| Christchurch, N.Z. | ... ... ... ... ... ... ... | |
| Colombo | ... ... ... ... ... ... ... ... | |
| Constantinople | ... ... ... ... ... ... ... ... | Admiral Woods Pasha. |
| | *Engineer Surveyor* ... ... ... ... ... | Warren, G. R. |
| Copenhagen | *Ship and Engineer Surveyor* (*Address*, 48, *Toldbodvej*) | Kindler, P. Fred. |
| Cronstadt | *Ship and Engineer Surveyor* ... ... ... ... (*Address*, *Krakow Kanal No.* 5, *St. Petersburg*) | Wessblad, A. |

| | | |
|---|---|---|
| DEMERARA | | Duncan, Alexander |
| DIEPPE | | |
| *DUBLIN | (*Office*, 153, *Cloncliffe Road*) | Mugford, John |
| *DUNDEE | (*Office*, 54, *Commercial Street*) | Cooper, George P. |
| | *Ship and Engineer Surveyor* | Sturrock, John |
| DUNEDIN, N.Z. | | Russell, James Ure |
| *FALMOUTH | (*Office*, 2, *Park Terrace*) | Sandry, T. H. |
| | *Engineer Surveyor* | Moreton, Lawrence |
| FIUME (*See* TRIESTE). | | |
| FOOCHOW | | |
| GALATZ | | |
| GEFLE | | |
| GENOA | (*Office, Via S. Luca No.* 2, *Prima Scala*) | Schiaffino, Francesco |
| | *Engineer Surveyor* (*residing at Marseilles*) | Westerman, Francis |
| GIBRALTAR | *Ship and Engineer Surveyor* (*Address, Government Dock Yard*) | Hook, James |
| *GLASGOW | (*Office* 36, *Oswald Street*) | William T. Mumford *Principal Surveyor.*<br>Burney, Charles E.<br>Courtier-Dutton, W. T.<br>Dodd, Thomas J.<br>Dove, Herbert W.<br>Edwards, Charles<br>Fowling, Charles<br>Hand, Henry<br>Roberts, J. T.<br>Stanbury, George<br>Thomson, Joseph |
| | *Engineer Surveyors* | Mollison, James<br>Robson, Walter E. |
| | *Ship and Engineer Surveyors* | Hindmarsh, G. L.<br>Sanderson, John |
| | *Inspector of Forgings for the Clyde District* | Newcomb, George |
| GOTHENBURG | *Ship and Engineer Surveyor* (*Address, Lazaretsgatan No.* 101 *b*) | Möller, Carl Axel |
| *GREENOCK | (*Office*, 13, *Hamilton Street*) | Christopher Besant *Principal Surveyor.*<br>Dawkins, John<br>Thearle, S. J. P. |
| | *Engineer Surveyor* | Heron, Andrew C.<br>Sullock, George T. |
| GUERNSEY | | Hunter, David |
| HALIFAX, N.S. | | Padderatz, Emil |
| HAMBURG | (*Office, Steinhöft No.* 3) | Berendt, M. |
| | *Engineer Surveyor* | |

| | | |
|---|---|---|
| HAMBURG—*cont.* | *Assistant Ship and Engineer Surveyor at Bremerhaven for the Weser District ... ... ... ...* (*Office, Burgermeister Smidt Strasse*, 103) | Thomsen, F. H. T. |
| | *Assistant Surveyor at Rostock...* ... ... ... | Cordes, W. |
| HANGCHOW | ... ... ... ... ... ... ... ... | |
| *HARTLEPOOL | (*Office, Dock Office Buildings, Victoria Terrace, West Hartlepool*) ... ... ... ... ... | Charles Davidson, *Principal Surveyor.*<br>Andrews, William<br>Phillips, Thomas<br>Wilkinson, Henri<br>Williams, H. M. |
| | *Engineer Surveyor* ... ... ... ... ... | Stoddart, J. E. |
| | *Ship and Engineer Surveyor* ... ... ... ... | Austin, R. W. |
| HAVRE | *Ship and Engineer Surveyor* ... ... ... ... (*Address*, 25, *Place de l'Hôtel de Ville*) | Le Laidier, A. |
| HELSINGFORS | *Ship and Engineer Surveyor* ... ... ... ... (*Address*, 23, *Brunnspark*) | Kolster, R. |
| HOBART, TASMANIA | ... ... ... ... ... ... ... ... | Macmillan, Donald |
| HONG KONG | ... ... ... ... ... ... ... ... | Burnie, Edward |
| | *Engineer Surveyor* ... ... ... ... ... (*Address, Lee Yeun Sugar Refinery*) | Johnston, Andrew |
| HUELVA | ... ... ... ... ... ... ... ... | |
| *HULL | (*Office, Bank Chambers, Land of Green Ginger, Hull*) | McNeil, James |
| | *Ship and Engineer Surveyor* ... ... ... ... | Innes, James |
| INVERCARGILL, N.Z. | ... ... ... ... ... ... ... ... | |
| *IPSWICH | ... ... ... (*Address*, 35, *Lower Orwell Street*) | Robertson, Ebenezer J. |
| KINGSTON, JAMAICA | *Ship and Engineer Surveyor...* ... ... ... (*Office, Government Works*) | Renwick, Charles E. |
| KURRACHEE | *Ship and Engineer Surveyor* ... ... ... ... (*Address, Persian Gulf Telegraphs, Manora, Kurrachee*) | Hughes, J. |
| LA ROCHELLE | ... ... ... ... ... ... ... ... | |
| LEGHORN | ... ... ... ... ... ... ... ... | Gori, Costantino |
| *LEITH | ... ... ... (*Office*, 56, *Constitution Street*) | Paulsen, William |
| | *Ship and Engineer Surveyor* ... ... ... ... | Darling, William J. |
| LISBON | *Ship and Engineer Surveyor* .. ... ... ... (*Address, Rua do Jardin do Tabaco* 33, 22°) | Westwood, J. |
| *LIVERPOOL | ... ... ... ... (*Office*, 12, *Oriel Chambers*) | John F. Light, *Secretary and Principal Surveyor.*<br>Champness, Edward C.<br>Lawrence, John<br>Moverly, William<br>Wheeler, Edward C. |
| | *Engineer Surveyors* ... ... ... ... ... | McGregor, Peter<br>Milner, G. A. |
| | *Ship and Engineer Surveyor* ... . ... .. | Hamilton, Andrew K. |

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|---|---|---|
| LUSSINO | (*See* TRIESTE). | |
| LYNN | ... ... ... ... ... ... ... ... | Beaumont, William F. |
| MALAGA | ... ... ... ... ... ... ... ... | |
| MALTA | *Ship and Engineer Surveyor* ... ... ... ... | Hinchcliffe, W. |
| MANILA | *Ship and Engineer Surveyor* ... ... ... ... | Sawyer, Frederick H. |
| MARSEILLES | *Ship and Engineer Surveyor* (*Address, Rue Suffren* 5) | Westerman, Francis |
| MAURITIUS | ... ... ... ... (*residing at Port Louis*) | Cowin, John |
| MELBOURNE, VICTORIA | ... ... ... ... ... ... ... | Watson, William |
| MEMEL | ... ... ... ... ... ... ... ... | |
| MESSINA | ... ... ... ... ... ... ... ... | |
| *MILFORD HAVEN | ... ... ... ... (*residing at Milford Haven*) | Warlow, James D. |
| | *Engineer Surveyor* ... ... ... ... ... (*Address*, 15, *Neyland Terrace, Neyland*) | Harris, W. |
| MONTREAL | ... ... ... (*Address, Port Warden's Office*) | Shaw, J. G. |
| NAGASAKI | ... ... ... ... ... ... ... ... | |
| NANTES | ... ... . . (*Address, Rue de l'Héronniere* 8) | Guibert, Auguste L. |
| NAPIER, N.Z. | ... ... ... ... ... ... ... ... | |
| NAPLES | ... ... ... ... ... ... ... ... | |
| NELSON, N.Z. | ... ... ... ... ... ... ... ... | |
| NEW PLYMOUTH, N.Z. | ... ... ... ... ... ... ... ... | |
| *NEW YORK | *Principal Surveyor for the United States* ... ... (*Office, Kemble Buildings, Whitehall Street*) | Congdon, Thomas |
| *NEWCASTLE-ON-TYNE | ... ... (*Office*, 3, *St. Nicholas Buildings*) | Henry J. Boolds, *Principal Surveyor.*<br>Cooke, Thomas H.<br>Mares, George R.<br>Scullard, J. W.<br>Sharpe, W. L.<br>Shilston, Thomas<br>Sibun, James<br>Skentelbery, C.<br>Williamson, Robert |
| | *Engineer Surveyors* ... .. ... ... ... | Brockat, John<br>Hirst, Richard<br>Walliker, J. F. |
| NEWCASTLE, N.S.W. | ... ... ... ... ... ... ... | |
| *NEWPORT, MON. | *Ship and Engineer Surveyor* (*Office*, 30, *Dock Street*) | Kendall, George |
| ODESSA | ... ... ... ... ... ... ... ... | |
| OPORTO | ... ... ... ... ... ... ... ... | |
| ORKNEYS | ... ... ... ... ....(*residing at Stromness*) | Mowat, James |
| OSAKA | ... ... ... ... ... ... ... ... | |

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|---|---|---|
| PALERMO | ... ... ... ... ... ... ... ... | |
| PHILADELPHIA | *Ship and Engineer Surveyor* ... ... ... ... (*Office*, 206, *Walnut Place*) | Haug, John |
| *PLYMOUTH | *Ship and Engineer Surveyor* (*Office*, 14, *Exchange*) | Taylor, J. E. |
| PORT NATAL | ... ... ... ... ... ... ... ... | Airth, Alexander |
| PORTLAND, MAINE | ... ... ... ... ... ... ... ... | |
| PORTLAND, OREGON | ... ... ... ... ... ... ... ... | |
| *PORTMADOC | ... ... ... ... ... ... ... ... | John, William |
| PRINCE EDWARD ISLAND | ... ... ... .. (*residing at Charlotte Town*) | Sloggett, Richard |
| QUEBEC | ... ... ... ... ... ... ... ... | Dick, John |
| *QUEENSTOWN | ... ... ... ... (*Office*, 1, *King's Terrace*) | Head, J. T. |
| RAMSGATE | ... ... ... ... ... ... ... ... | Jones, Edward |
| RANGOON | ... ... ... ... ... ... ... ... | Winter, R. W. |
| RIGA | ... ... ... ... ... ... ... ... | Lindemann, C. A. |
| | *Engineer Surveyor* ... ... ... ... ... (*Address, Pychau Dampfsagemühle*) | Hillbring, F. W. |
| RIO DE JANEIRO | ... ... ... ... ... ... ... ... | |
| ROCHEFORT | ... ... ... ... ... ... ... ... | |
| ROSTOCK (*See* HAMBURG). | | |
| ROTTERDAM | ... ... ... ... (*Address, Westerhaven* 6) | Loos, Jan C. W. |
| | *Ship and Engineer Surveyor for the Ports in Holland* | *Ollefen, W. F. D. van |
| ST. JOHN, N.B. | ... ... ... ... ... ... ... .. | Coker, Charles, R. |
| ST. MALO | ... ... ... ... ... ... ... ... | |
| SALONICA | ... ... ... ... ... ... ... ... | |
| SAMARANG | ... ... ... ... ... ... ... ... | |
| SAN FRANCISCO | ... ... ... ... (*Office*, 219, *Sansome Street*) | Freeman, J. H. |
| SEBASTOPOL | *Ship and Engineer Surveyor* ... ... ... ... | Corry, John E. |
| SHANGHAI | ... ... ... ... ... ... ... ... | Warburg, C. G. |
| | *Engineer Surveyor* ... ... ... ... ... | Sonne, H. |
| SINGAPORE | ... ... ... ... ... ... ... ... | Fittock, Charles |
| | *Engineer Surveyor* ... ... ... ... ... (*Address, Ice Works, River Valley Road*) | Park, Robert |
| SLIGO | ... ... ... ... ... ... ... ... | Pollexfen, William |
| SMYRNA | ... ... ... ... ... ... ... ... | |
| SOURABAYA | ... ... ... ... ... ... ... ... | Vader, P. |
| *SOUTHAMPTON | ... ... ... ... (*Office*, 9, *Oriental Place*) | Sinnette, James L |
| | *Engineer Surveyor* ... ... ... ... ... | Stevens, John B. |
| SUEZ | ... ... ... ... ... ... ... ... | |

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|---|---|---|
| *Sunderland ... ... ... ... | (*Office*, 56, *John Street*) | Richard J. Reed, *Principal Surveyor*<br>Bath, William<br>Johnstone, William<br>Keen, Joseph<br>Rutherford, John<br>Williams, Jesse |
| | *Engineer Surveyors* ... ... ... ... ... | Allison, William<br>Salmon, Patrick |
| | *Inspector of Forgings for the North-east Coast* ... | Cameron, Hugh |
| *Swansea ... ... | *Office, Adelaide Chambers, Adelaide Street*) | Ashton, Thomas |
| Sydney, N.S.W. ... ... ... | (*Office*, 22, *Bridge Street, Sydney*) | Pockley, Robert F. |
| Syra ... ... ... ... ... ... ... ... | | |
| Taganrog ... ... ... ... ... ... ... ... | | |
| Toronto ... ... ... ... ... ... ... ... | | |
| Trieste ... | (*Office, Piazza dei Negozianti No. 2, primo piano*) | Florio, Elias |
| | *Engineer Surveyor for Trieste District* ... ... | Schnabl, Frederick |
| | *Assistant Surveyor at Fiume* ... ... ... ... | Bonetich, Ignazio |
| | *Ditto at Lussino* ... ... ... ... | Tarrabocchia, Antonio E |
| | *Ditto at Venice* ... ... ... ... | Fabro, Matteo |
| Valencia ... ... ... ... ... ... ... ... | | |
| Valparaiso | *Ship and Engineer Surveyor* ... ... ... ... | Ivol, C. C. |
| Veendam ... ... | (*Address, Kerklaan H*, 785, *Veendam*) | Hazewinkel, H. P. |
| Venice (*See* Trieste). | | |
| Waterford | *Ship and Engineer Surveyor* ... ... ... ... | Horn, Andrew |
| Wellington, N.Z. ... ... ... ... ... ... ... ... | | Bendall, William |
| Wexford ... ... ... ... ... ... ... ... | | |
| *Whitehaven ... ... ... ... ... ... ... ... | | House, Thomas J. |
| Wilmington, N.C. ... ... ... ... ... ... ... ... | | |
| Yokohama ... ... ... ... ... ... ... ... | | Efford, John J. |

## ENGINEER SURVEYORS TO THIS SOCIETY, WITH THE DISTRICTS ASSIGNED TO THEM.

*Those at Ports marked with an Asterisk (*) are exclusively the Officers of the Society.*

| | Districts. | | Letters to be addressed to— |
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| JAMES T. MILTON ... ... ... | | | |
| DAVID PURVES ... ... ... | | | |
| GEORGE E. WILKINSON ... ... | | | |
| CHARLES E. STROMEYER ... ... | | | |
| ***Liverpool.** | | | |
| PETER MCGREGOR ... ... ... | Liverpool, Carnarvon | and intermediate Ports. | *The Secretary, Lloyd's Register of Shipping, Oriel Chambers, Liverpool.* |
| G. A. MILNER ... ... ... ... | | | |
| A. K. HAMILTON ... ... ... | | | |
| ***Aberdeen.** | | | |
| JOHN H. HECK ... ... ... ... | Aberdeen, Banff, Peterhead, Fraserburgh | ditto. | *Lloyd's Register of Shipping, 29, Regent Quay, Aberdeen.* |
| ***Barrow.** | | | |
| DUNCAN RITCHIE ... ... ... | Barrow, Whitehaven, Workington | ditto. | *Lloyd's Register of Shipping, 8, Strand, Barrow.* |
| ***Belfast.** | | | |
| J. MAXTON ... ... ... ... | Belfast | ditto. | *Lloyd's Register of Shipping, Victoria Chambers, Waring Road, Belfast.* |
| ***Bristol.** | | | |
| R. W. COOMBER ... ... ... | Bristol, Gloucester, Bridgewater | ditto. | *Lloyd's Register of Shipping, 53, Queen Square, Bristol.* |
| ***Cardiff.** | | | |
| A. E. KEYDELL ... ... | Cardiff, Swansea | ditto | *Lloyd's Register of Shipping, 4, Bute Crescent, Cardiff.* |
| J. H. MANCOR ... ... ... | | | |
| ***Clyde.** | | | |
| JAMES MOLLISON ... ... ... | Glasgow, Greenock | ditto. | *Lloyd's Register of Shipping, 36, Oswald Street, Glasgow; or Union Bank Building, 2, Church Place, Greenock.* |
| W. E. ROBSON ... ... ... ... | | | |
| G. L. HINDMARSH ... ... ... | | | |
| ANDREW C. HERON ... ... ... | | | |
| JOHN SANDERSON ... ... ... | | | |
| ***Dundee.** | | | |
| JOHN STURROCK ... ... ... | Dundee, Perth, Forfar | ditto. | *Lloyd's Register of Shipping, 54, Commercial Street, Dundee.* |
| ***Falmouth.** | | | |
| LAWRENCE MORETON ... ... | Falmouth, Plymouth | ditto. | *Lloyd's Register of Shipping, 2, Lansdowne Road, Falmouth.* |
| ***Hartlepool** | Hartlepool, West Hartlepool, Stockton, Middlesbrough, Whitby, Scarbro' | ditto. | *Lloyd's Register of Shipping, Dock Office Buildings, Victoria Terrace. West Hartlepool.* |
| J. E. STODDART ... ... | | | |
| W. R. AUSTIN ... ... | | | |

ENGINEER SURVEYORS TO THIS SOCIETY, WITH THE DISTRICTS ASSIGNED TO THEM—*continued.*

| | | | |
|---|---|---|---|
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| ***Newcastle.**<br>JOHN BROCKAT... ... ... ...<br>J. F. WALLIKER ... ... ...<br>RICHARD HIRST ... ... ... | Newcastle<br>Shields<br>Blyth | ditto | *Lloyd's Register of Shipping,*<br>*3, St. Nicholas Buildings,*<br>*Newcastle.* |
| ***Newport.**<br>GEORGE KENDALL ... ... | Newport<br>Chepstow<br>Bristol | | *Lloyd's Register of Shipping,*<br>*30, Dock Street,*<br>*Newport, Mon.* |
| ***Southampton.**<br>JOHN B. STEVENS ... ... | Southampton<br>Shoreham<br>Bridport<br>Isle of Wight | ditto. | *Lloyd's Register of Shipping,*<br>*9, Oriental Place,*<br>*Southampton.* |
| ***Sunderland.**<br>WILLIAM ALLISON ... ... ...<br>PATRICK SALMON ... ... ... | Sunderland | ditto | *Lloyd's Register of Shipping,*<br>*56, John Street,*<br>*Sunderland.* |
| **Waterford.**<br>ANDREW HORN ... ... ... | Waterford | | *Lloyd's Register of Shipping,*<br>*Waterford.* |
| **Cronstadt.**<br>A. WESSBLAD ... ... ... | Cronstadt<br>St. Petersburg | | *Lloyd's Register of Shipping,*<br>*5, Krakow Kanal,*<br>*St. Petersburg.* |
| **Helsingfors.**<br>R. KOLSTER ... ... ... | Helsingfors | | *Lloyd's Register of Shipping,*<br>*Helsingfors.* |
| **Gothenburg.**<br>CARL AXEL MÖLLER ... | Gothenburg | | *Lloyd's Register of Shipping,*<br>*Lazareltsgatan, No.* 101B,<br>*Gothenburg.* |
| **Riga.**<br>F. W. HILLBRING ... ... | Riga | | *Lloyd's Register of Shipping,*<br>*Pychau Dampfsagemükla,*<br>*Riga.* |
| **Bergen.**<br>E. HOUGLAND ... ... ... | Norway | | *Lloyd's Register of Shipping,*<br>*Strandgaden, 5, Rode No.* 13,<br>*Bergen.* |
| **Copenhagen.**<br>P. FRED. KINDLER ... ... | Copenhagen | | *Lloyd's Register of Shipping,*<br>*48, Toldbodvej,*<br>*Copenhagen.* |
| **Hamburg.**<br>M. BERENDT ... ... ... | River Elbe and Ports in Holstein | ditto. | *Lloyd's Register of Shipping,*<br>*Steinhöft, No.* 3,<br>*Hamburg.* |

ENGINEER SURVEYORS TO THIS SOCIETY, WITH THE DISTRICTS ASSIGNED TO THEM—*continued.*

| | | | |
|---|---|---|---|
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| ***Holland.**<br>W. F. D. van OLLEFEN ... ... | Amsterdam<br>Rotterdam<br>Nieuwdiep<br>Flushing<br>Harlingen | and intermediate Ports. | *Lloyd's Register of Shipping,*<br>*Amsterdam ; or*<br>*Westerhaven* 6,<br>*Rotterdam ; or*<br>*Kerklaam H* 785<br>*Veendam* (as the case may be) |
| **Belgium.**<br>FRANCIS DEMBLON ... .. | Antwerp | | *Lloyd's Register of Shipping,*<br>14, *Rue Nassau,*<br>*Antwerp.* |
| **Havre.**<br>A. LE LAIDIER ... ... ... | Boulogne<br>Havre<br>Barfleur | ditto. | *Lloyd's Register of Shipping,*<br>25, *Place de l'Hôtel de Ville,*<br>*Havre.* |
| **Bordeaux.**<br>A. DONZELLE ... ... ... | Bordeaux | | *Lloyd's Register of Shipping,*<br>108, *Rue du Palais Gallien,*<br>*Bordeaux.* |
| **Barcelona.**<br>J. J. BROWNE ... ... ... | Barcelona | | *Lloyd's Register of Shipping,*<br>*Portico Xifré,* 10, 1°<br>*Barcelona.* |
| **Cadiz.**<br>JAMES COCHRANE ... ... | Cadiz | | *Lloyd's Register of Shipping,*<br>25, *Aduana,*<br>*Cadiz.* |
| **Lisbon.**<br>J. WESTWOOD ... ... ... | Lisbon | | *Lloyd's Register of Shipping,*<br>*Rua do Jardin do Tabaco* 33, 22°<br>*Lisbon.* |
| **Gibraltar.**<br>JAMES HOOK ... ... ... | Gibraltar | | *Lloyd's Register of Shipping,*<br>*Government Dockyard,*<br>*Gibraltar.* |
| **Marseilles and Genoa.**<br>FRANCIS WESTERMAN ...<br>*(Residing at Marseilles)* ... | Marseilles,<br>Genoa,<br>and<br>Leghorn | ditto. | *Lloyd's Register of Shipping,*<br>*Marseilles, or Genoa*<br>(as the case may be). |
| **Malta.**<br>W. HINCHCLIFFE ... ... | Malta | | *Lloyd's Register of Shipping,*<br>*Malta.* |
| **Trieste.**<br>FREDERIC SCHNABL ... ... | Trieste | | *Lloyd's Register of Shipping,*<br>*Piazza dei Negozianti, No.* 2,<br>*Primopiano,*<br>*Trieste* |
| **Constantinople.**<br>G. R. WARREN ... ... ... | Constantinople | | *Lloyd's Register of Shipping,*<br>*Constantinople.* |
| **Sebastopol.**<br>JOHN E. CORRY ... ... | Sebastopol | | *Lloyd's Register of Shipping,*<br>*Sebastopol* |
| **Akyab.**<br>C. McLAGGAN ... ... ... | Akyab | | *Lloyd's Register of Shipping,*<br>*Akyab.* |

ENGINEER SURVEYORS TO THIS SOCIETY, WITH THE DISTRICTS ASSIGNED TO THEM—*continued.*

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| **Singapore.** ROBERT PARK ... ... ... | Singapore | *Lloyd's Register of Shipping, Ice Works, River Valley Road, Singapore.* |
| **Batavia.** WILLIAM FARGIE ... .. | Batavia | *Lloyd's Register of Shipping, Batavia.* |
| **Manila.** FREDERICK H. SAWYER... ... | Manila | *Lloyd's Register of Shipping, Manila.* |
| **Hong Kong.** ANDREW JOHNSTON ... ... | Hong Kong | *Lloyd's Register of Shipping, Lee Yeun Sugar Refinery, Hong Kong.* |
| **Shanghai.** H. SONNE ... ... ... | Shanghai | *Lloyd's Register of Shipping, Shanghai.* |
| **Philadelphia.** JOHN HAUG ... ... ... | Philadelphia | *Lloyd's Register of Shipping, 206, Walnut Place, Philadelphia.* |
| **New York.** | | *Lloyd's Register of Shipping, Kemble Building, Whitehall Street, New York* |
| **Baltimore.** RICHARD WELLS ... ... | Baltimore | *Lloyd's Register of Shipping, 11, South Gay Street, Baltimore.* |
| **Boston.** OLIVER L. SHAW ... ... | Boston | *Lloyd's Register of Shipping, 24, White Street, East Boston.* |
| **Buenos Ayres.** W. E. HUNTER ... ... | Buenos Ayres | *Lloyd's Register of Shipping, Buenos Ayres.* |
| **Valparaiso.** C. C. IVOL ... ... ... | Valparaiso | *Lloyd's Register of Shipping, Valparaiso.* |

# STATEMENT, Showing the Number, Gross Tonnage, Classes, &c., of the Vessels in the Register Book, 1886-87.

## IRON VESSELS.

### STEAMERS.

| Class. | BRITISH. No. | BRITISH. Tonnage. | COLONIAL. No. | COLONIAL. Tonnage. | FOREIGN. No. | FOREIGN. Tonnage. | TOTAL. No. | TOTAL. Tonnage. |
|---|---|---|---|---|---|---|---|---|
| *A | 17 | 17,040 | .. | .. | 3 | 4,012 | 20 | 21,052 |
| A | 40 | 27,419 | .. | .. | 8 | 4,729 | 48 | 32,148 |
| A | 76 | 56,524 | 1 | 948 | 18 | 13,534 | 95 | 71,006 |
| A | 30 | 19,688 | .. | .. | 4 | 2,458 | 34 | 22,146 |
| A | 12 | 5,072 | 4 | 661 | 12 | 6,029 | 28 | 11,762 |
| 100 A | 2,121 | 3,168,075 | 51 | 52,968 | 509 | 885,171 | 2,681 | 4,106,214 |
| 95 A | 12 | 8,458 | .. | .. | 5 | 4,642 | 17 | 13,100 |
| 90 A | 435 | 363,202 | 14 | 10,635 | 119 | 98,628 | 568 | 472,465 |
| 85 A | 8 | 5,875 | .. | .. | .. | .. | 8 | 5,875 |
| 80 A | 23 | 16,448 | .. | .. | 8 | 4,616 | 31 | 21,064 |
| 75 A | 2 | 1,422 | .. | .. | .. | .. | 2 | 1,422 |
| Lv A1* / Lv A1* | 271 | 499,420 | 2 | 2,552 | 17 | 28,255 | 290 | 530,227 |
| Lv A1 / Lv A1 | 153 | 64,622 | 1 | 163 | 6 | 6,434 | 160 | 71,219 |
| Lv A / Lv A | 21 | 17,618 | .. | .. | 2 | 1,020 | 23 | 18,638 |
| Total Classed | 3,221 | 4,270,883 | 73 | 67,927 | 711 | 1,059,528 | 4,005 | 5,398,338 |
| Dis-Classed | 402 | 454,528 | 66 | 53,991 | 358 | 311,912 | 826 | 820,431 |
| Never Classed | 890 | 1,212,456 | 46 | 28,369 | 368 | 564,764 | 1,304 | 1,805,589 |
| Gross Total. | 4,513 | 5,937,867 | 185 | 150,287 | 1,437 | 1,936,204 | 6,135 | 7,024,358 |

### SAILING SHIPS.

| Class. | BRITISH. No. | BRITISH. Tonnage. | COLONIAL. No. | COLONIAL. Tonnage. | FOREIGN. No. | FOREIGN. Tonnage. | TOTAL. No. | TOTAL. Tonnage. |
|---|---|---|---|---|---|---|---|---|
| *A | 498 | 489,721 | 15 | 11,518 | 40 | 25,826 | 553 | 527,065 |
| A | 13 | 15,427 | 5 | 2,066 | 8 | 3,553 | 26 | 21,046 |
| A | 5 | 2,519 | 1 | 420 | .. | .. | 6 | 2,939 |
| A | 2 | 3,926 | .. | .. | .. | .. | 2 | 3,926 |
| A | 9 | 5,974 | .. | .. | 5 | 2,167 | 14 | 8,141 |
| 100 A | 933 | 1,198,379 | 26 | 25,753 | 55 | 55,027 | 1,014 | 1,279,159 |
| 95 A | 2 | 785 | .. | .. | 1 | 854 | 3 | 1,639 |
| 90 A | 2 | 564 | 3 | 582 | 3 | 2,161 | 8 | 3,307 |
| 85 A | 1 | 227 | .. | .. | .. | .. | 1 | 227 |
| 80 A | 1 | 54 | .. | .. | .. | .. | 1 | 54 |
| 75 A | .. | .. | .. | .. | .. | .. | .. | .. |
| Lv A1* / Lv A1* | 12 | 16,020 | .. | .. | .. | .. | 12 | 16,020 |
| Lv A1 / Lv A1 | 1 | 1,778 | .. | .. | .. | .. | 1 | 1,778 |
| Lv A / Lv A | .. | .. | .. | .. | .. | .. | .. | .. |
| Total Classed | 1,479 | 1,735,374 | 50 | 40,339 | 112 | 89,588 | 1,641 | 1,865,301 |
| Dis-Classed | 35 | 28,501 | 11 | 3,718 | 18 | 12,295 | 64 | 44,514 |
| Never Classed | 116 | 76,043 | 4 | 2,687 | 31 | 26,230 | 151 | 104,960 |
| Gross Total | 1,630 | 1,839,918 | 65 | 46,744 | 161 | 128,113 | 1,856 | 2,014,775 |

## STEEL VESSELS.

### STEAMERS.

| Class. | BRITISH. No. | BRITISH. Tonnage. | COLONIAL. No. | COLONIAL. Tonnage. | FOREIGN. No. | FOREIGN. Tonnage. | TOTAL. No. | TOTAL. Tonnage. |
|---|---|---|---|---|---|---|---|---|
| 100 A | 219 | 426,701 | 29 | 44,518 | 58 | 104,619 | 306 | 575,838 |
| 95 A | 2 | 1,147 | .. | .. | .. | .. | 2 | 1,147 |
| 90 A | 9 | 4,232 | 10 | 5,341 | 10 | 7,219 | 29 | 16,792 |
| A | 1 | 443 | .. | .. | .. | .. | 1 | 443 |
| A | 18 | 6,532 | 2 | 1,127 | 6 | 4,508 | 26 | 12,167 |
| Lv A1* / Lv A1* | 48 | 81,897 | 2 | 2,495 | 2 | 1,974 | 52 | 86,366 |
| Lv A1 / Lv A1 | 2 | 1,353 | .. | .. | .. | .. | 2 | 1,353 |
| Total Classed | 299 | 522,305 | 43 | 53,481 | 76 | 118,320 | 418 | 694,106 |
| Dis-Classed | 11 | 15,160 | .. | .. | .. | .. | 11 | 15,160 |
| Never Classed | 109 | 153,716 | 2 | 1,174 | 14 | 23,776 | 125 | 178,666 |
| Gross Total | 419 | 691,181 | 45 | 54,655 | 90 | 142,096 | 554 | 887,932 |

### SAILING SHIPS.

| Class. | BRITISH. No. | BRITISH. Tonnage. | COLONIAL. No. | COLONIAL. Tonnage. | FOREIGN. No. | FOREIGN. Tonnage. | TOTAL. No. | TOTAL. Tonnage. |
|---|---|---|---|---|---|---|---|---|
| 100 A | 56 | 75,422 | .. | .. | 1 | 333 | 57 | 75,755 |
| 95 A | .. | .. | .. | .. | .. | .. | .. | .. |
| 90 A | .. | .. | .. | .. | .. | .. | .. | .. |
| A | .. | .. | .. | .. | .. | .. | .. | .. |
| A | 6 | 255 | .. | .. | .. | .. | 6 | 255 |
| Lv A1* / Lv A1* | 2 | 4,240 | .. | .. | .. | .. | 2 | 4,240 |
| Lv A1 / Lv A1 | .. | .. | .. | .. | .. | .. | .. | .. |
| Total Classed | 64 | 79,917 | .. | .. | 1 | 333 | 65 | 80,250 |
| Dis-Classed | 1 | 4,368 | 4 | 2,744 | 1 | 723 | 6 | 7,835 |
| Never Classed | 6 | 5,802 | 1 | 1,283 | .. | .. | 7 | 7,085 |
| Gross Total | 71 | 90,087 | 5 | 4,027 | 2 | 1,056 | 78 | 95,170 |

## WOOD VESSELS
(INCLUDING COMPOSITE).

| Class. | BRITISH. Number. | BRITISH. Tonnage. | COLONIAL. Number | COLONIAL. Tonnage. | FOREIGN. Number. | FOREIGN. Tonnage. | TOTAL. Number. | TOTAL. Tonnage. |
|---|---|---|---|---|---|---|---|---|
| 23 A | 1 | 625 | .. | .... | .. | .... | 1 | 625 |
| 22 A | 1 | 468 | .. | .... | .. | .... | 1 | 468 |
| 20 A | 2 | 3,514 | .. | .... | 1 | 566 | 3 | 4,080 |
| 19 A | 40 | 30,799 | 2 | 650 | .. | .... | 42 | 31,449 |
| 18 A | 38 | 29,929 | 2 | 361 | 3 | 1,265 | 43 | 31,555 |
| 17 A | 19 | 13,109 | 1 | 326 | 1 | 892 | 21 | 14,327 |
| 16 A | 36 | 21,199 | 1 | 451 | 3 | 1,900 | 40 | 23,550 |
| 15 A | 55 | 29,000 | 4 | 1,757 | 8 | 4,918 | 67 | 35,675 |
| 14 A | 79 | 32,677 | 6 | 2,466 | .. | .... | 85 | 35,143 |
| 13 A | 158 | 36,446 | 8 | 3,146 | 19 | 9,304 | 185 | 48,896 |
| 12 A | 447 | 82,839 | 5 | 1,195 | 45 | 25,589 | 497 | 109,623 |
| 11 A | 218 | 41,948 | 9 | 3,672 | 47 | 32,157 | 274 | 77,777 |
| 10 A | 238 | 47,550 | 49 | 28,441 | 30 | 7,990 | 317 | 83,981 |
| 9 A | 207 | 37,364 | 84 | 48,092 | 26 | 9,490 | 317 | 94,946 |
| 8 A | 26 | 5,314 | 10 | 4,152 | 10 | 2,780 | 46 | 12,246 |
| 7 A | 10 | 4,806 | 6 | 1,875 | 3 | 951 | 19 | 7,632 |
| 6 A | 3 | 869 | 2 | 1,288 | 1 | 522 | 6 | 2,679 |
| 5 A | 5 | 391 | .. | .... | 1 | 208 | 6 | 599 |
| 4 A | 1 | 157 | .. | .... | 6 | 674 | 7 | 831 |
| A | 1 | 34 | .. | .... | .. | .... | 1 | 34 |
| A | 156 | 29,250 | 4 | 727 | 19 | 9,099 | 179 | 39,076 |
| Æ | 57 | 12,106 | 3 | 868 | 3 | 825 | 63 | 13,799 |
| Total Classed | 1,798 | 460,394 | 196 | 99,467 | 226 | 109,130 | 2,220 | 668,991 |
| Disclassd | 2,140 | 514,627 | 209 | 89,110 | 421 | 232,383 | 2,770 | 836,120 |
| Never Classed | 588 | 268,865 | 24 | 20,360 | 728 | 385,706 | 1,340 | 674,931 |
| Gross Total | 4,526 | 1,243,886 | 429 | 208,937 | 1,375 | 727,219 | 6,330 | 2,180,042 |

## SUMMARY OF THE NUMBER, GROSS TONNAGE &c., OF THE VESSELS IN THE REGISTER BOOK, 1886–87.

| | IRON. STEAM. BRITISH. No. | IRON. STEAM. BRITISH. Tons. | IRON. STEAM. COLONIAL. No | IRON. STEAM. COLONIAL. Tons. | IRON. STEAM. FOREIGN. No. | IRON. STEAM. FOREIGN. Tons. | IRON. SAIL. BRITISH. No. | IRON. SAIL. BRITISH. Tons. | IRON. SAIL. COLONIAL. No | IRON. SAIL. COLONIAL. Tons. | IRON. SAIL. FOREIGN. No. | IRON. SAIL. FOREIGN. Tons. | STEEL. STEAM. BRITISH. No. | STEEL. STEAM. BRITISH. Tons. | STEEL. STEAM. COLONIAL. No | STEEL. STEAM. COLONIAL. Tons. | STEEL. STEAM. FOREIGN. No. | STEEL. STEAM. FOREIGN. Tons. | STEEL. SAIL. BRITISH. No. | STEEL. SAIL. BRITISH. Tons. | STEEL. SAIL. COLONIAL. No | STEEL. SAIL. COLONIAL. Tons. | STEEL. SAIL. FOREIGN. No. | STEEL. SAIL. FOREIGN. Tons. | WOOD (INCLUDING COMPOSITE). BRITISH. No. | WOOD (INCLUDING COMPOSITE). BRITISH. Tons. | WOOD (INCLUDING COMPOSITE). COLONIAL. No | WOOD (INCLUDING COMPOSITE). COLONIAL. Tons. | WOOD (INCLUDING COMPOSITE). FOREIGN. No. | WOOD (INCLUDING COMPOSITE). FOREIGN. Tons. | TOTAL. No. | TOTAL. Tons. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASSED .. | 3,221 | 4,270,883 | 73 | 67,927 | 711 | 1,059,528 | 1,479 | 1,735,374 | 50 | 40,339 | 112 | 89,588 | 299 | 522,305 | 43 | 53,481 | 76 | 118,320 | 64 | 79,917 | .. | .. | 1 | 333 | 1,798 | 460,394 | 196 | 99,467 | 226 | 109,130 | 8,349 | 8,706,986 |
| DISCLASSED | 402 | 454,528 | 66 | 53,991 | 358 | 311,912 | 35 | 28,501 | 11 | 3,718 | 18 | 12,295 | 11 | 15,160 | .. | .. | .. | .. | 1 | 4,368 | 4 | 2,744 | 1 | 723 | 2,140 | 514,627 | 209 | 89,110 | 421 | 232,383 | 3,677 | 1,724,060 |
| NEVER CLASSED | 890 | 1,212,456 | 46 | 28,369 | 368 | 564,764 | 116 | 76,043 | 4 | 2,687 | 31 | 26,230 | 109 | 153,716 | 2 | 1,174 | 14 | 23,776 | 6 | 5,802 | 1 | 1,283 | .. | .. | 588 | 268,865 | 24 | 20,360 | 728 | 385,706 | 2,927 | 2,771,231 |
| TOTALS .... | 4,513 | 5,937,867 | 185 | 150,287 | 1,437 | 1,936,204 | 1,630 | 1,839,918 | 65 | 46,744 | 161 | 128,113 | 419 | 691,181 | 45 | 54,655 | 90 | 142,096 | 71 | 90,087 | 5 | 4,027 | 2 | 1,056 | 4,526 | 1,243,886 | 429 | 208,937 | 1,375 | 727,219 | 14,953 | 13,202,277 |

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# LLOYD'S REGISTER

OF

# BRITISH AND FOREIGN SHIPPING.

## RULES AND REGULATIONS.

**Section 1.** The operations of the Societies of the two Register Books of Shipping formerly printed for the use of Merchants, Ship Owners, and Underwriters, having ceased in the year 1834, this Society was then established for the purpose of obtaining a faithful and accurate Classification of the Mercantile Shipping of the United Kingdom, and of the Foreign Vessels trading thereto, and for the government of which the following Rules and Regulations have been from time to time adopted.

**Section 2.** A Register Book to be printed annually for the use of Subscribers, containing the names of the Ships with other useful information, and the Character assigned, where the vessels are classed by the Society; also the names, &c., of all Ships of 100 tons and upwards registered in the United Kingdom, although unclassed by this Society, and of Ships of large tonnage owned abroad.

**Section 3.** Each person subscribing the sum of Three Guineas per annum (or such other sum as the General Committee may fix) to be considered a Member of the Society, and entitled *for his own use* to one copy of the Register Book.

**Section 4.** The subscription of Public Companies, or Public Establishments (not being engaged in Marine Insurance), to be Ten Guineas per Annum.

**Section 5.** The subscription of Marine Insurance Companies to be regulated by the Committee on special application, in each case, but not to be less than Ten Guineas per Annum.

**Section 6.** The Register Books supplied to Subscribers in London will be (unless otherwise arranged) periodically posted by type, with additions and corrections throughout the year. But in the case of the Books supplied on a Subscription of £3 3s. per annum, thus posted, a charge of One Guinea per annum will be made in addition, for posting, making the Subscription £4 4s. per annum.

**Section 7.** For the convenience of Subscribers not resident in London, or whose Register Books are not posted, a Supplement, containing the additions to, and corrections made in, the Register Book, to be printed, fortnightly, in such convenient form, as to admit of its transmission by Post, so that such parties may be furnished, from time to time, with the latest and most complete information.

**Section 8.** 1. The superintendence of the affairs of the Society to be under the direction of a Committee of Merchants, Shipowners, and Underwriters: twenty-four elected in London and twenty-four at the principal Outports, and in addition, the Chairman for managing the affairs of Lloyd's, and the Chairman of the General Shipowners' Society, for the time being, to be, *ex-officio*, Members of the Committee, but any member (except an ex-officio member) who fails to attend any meetings of the Committee for a period of six continuous months, without leave of absence, shall cease to be a member, and his place shall be filled up in the usual way.

2. The General Committee reserve the right of varying or withdrawing the representation of Outports, as well as the mode of election of Members.

**Section 9.** Six of the Members elected in London, namely, two of each of the constituent parts of the Committee, to go out annually by rotation, but to be eligible to be re-elected. The vacancies so arising to be filled up by the election of two Underwriters and one Merchant by the Committee of Lloyd's, and two Shipowners and one Merchant by the Committee of the General Shipowners' Society.

**Section 10.** Of the Members elected at the Outports twenty are to retire at the end of every *four* years, and four of the Members elected at Liverpool are to retire annually. The retiring Members are eligible for re-election.

**Section 11.** The Committee to appoint from their own body, annually, a Chairman and Deputy-Chairman, and also a Chairman for a Sub-Committee of Classification.

**Section 12.** The Committee to appoint a Sub-Committee of Classification, to be so regulated that each Member of the General Committee may, in rotation, take his turn of duty therein throughout the year.

**Section 13.** The Secretary, Clerks, and Servants of the Society, and the Surveyors, to be appointed by and be under the direction of the General Committee.

**Section 14.** Special meetings to be convened by order of the Chairman, or Deputy-Chairman, or on the requisition of any three Members.

**Section 15.** All elections and appointments to be made by ballot.

**Section 16.** No Member of the Committee to be permitted to be present on the decision of the classification of any ship of which he is the owner, or wherein he is directly or indirectly interested.

**Section 17.** 1. The Committee to be empowered to make such Bye-laws for their own government and proceedings as they may deem requisite, not being inconsistent with the original Rules and Regulations under which the Society was established; but no new Rule or By-law to be introduced, or any Rule or By-law altered, without special notice being given for that purpose at the Meeting of the Committee next preceding that at which such Motion is intended to be made; such notice to be inserted in the summons convening the meeting.

2. No new Rule, or alteration in any existing Rule, materially affecting the classification of ships, to take effect until the expiration of six months from the time it shall have been determined upon.

**Section 18.** All Reports of survey to be made in writing by the Surveyors according to the form prescribed, and submitted for the consideration of the General Committee, or of the Sub-Committees

of Classification; but the Character assigned by the latter to be subject to confirmation by the General Committee.

**Section 19.** 1. The reports of the Surveyors, and all documents and proceedings relating to the classification of ships, to be carefully preserved, and parties proving themselves to be interested therein, to have access to the same under the direction of the Chairman or Deputy-Chairman.

2. Copies of the original reports (if the ships be already classed, but not otherwise), so far as relates to the dimensions, scantlings, fastenings, and materials, in cases where the correctness of the reports in these particulars is certified by the builders, are granted on application.

**Section 20.** Foreign ships, and ships built in the British possessions abroad where there is not a Surveyor (*see also* Section 52), to be surveyed on their arrival at a port to which a Surveyor has been appointed; but a due regard is to be had to the circumstance of such vessels having been exempted from supervision while building, and the Character to be assigned to them is to be regulated according to their intrinsic quality and from the best information the Committee can obtain.

**Section 21.** In every case in which the Character assigned to a ship may be proposed, on survey, to be reduced, notice is to be given in writing to the Owner, Master, or Agent, with an intimation that if the reduction be objected to, the Committee will be ready to direct a special survey, on the Owner, Master, or Agent agreeing to pay the expenses attending the same, provided on the said survey there shall appear sufficient ground for the proposed reduction.

**Section 22.** 1. When the Surveyors consider repairs to be requisite, they are respectfully to communicate the same in writing to the Owner, Master, or Agent, and if such repairs be not entered upon within a reasonable time, a corresponding report is to be made, as soon as possible, to the Committee for their decision thereon.

2. All repairs of Ships or Machinery required at Ports where there is a Surveyor to this Society, in order to their obtaining a Character in the Register Book, or to their retaining the Characters assigned to them therein, must be carried out under the inspection, and to the satisfaction of the Society's Surveyors. Ships or machinery repaired at Ports where there is no Surveyor to this Society must be surveyed by one of the Society's Surveyors at the earliest opportunity.

**Section 23.** Parties considering the repairs suggested by the Surveyor to be unnecessary or unreasonable may appeal to the Committee, who will direct a special survey to be held; but should the opinion of the Surveyor be confirmed by the Committee, then the expense of such special survey is to be paid by the party appealing.

**Section 24.** The Surveyors to the Society not to be permitted (without the especial sanction of the Committee) to receive any fee, gratuity, or reward whatsoever for their own use or benefit, for any service performed by them in their capacity of Surveyors to this Society, on pain of immediate dismissal.

**Section 25.** The Surveyors will be directed to attend on Special Surveys of ships or machinery while building or under damage or repair, when required by Merchants, Shipowners, or Underwriters; the charge for which is to be regulated according to the nature and extent of the service performed. In all cases, the application for the assistance of the Surveyors must be made in writing addressed to the Secretary.

## FUNDS.

**Section 26.** The Funds to be under the authority and control of the Committee, and a statement of the Receipts and Expenditure to be annually printed for the information of the subscribers.

**Section 27.** The following Fees to be charged to the Owners of ships prior to their vessels being classed and registered in the book :—

### I.

CLASSING FEES.

*For First Entry of Class in the Register Book, or for Recording Continuation or Restoration, or A in Red, or for Special Survey No. 3 of Iron Ships.*

| | | |
|---|---|---|
| For each Ship under 200 tons ... ... ... ... ... | £1 | 0 0 |
| Ditto of 200 and under 500 Tons ... ... .. | 2 | 0 0 |
| Ditto of 500 ,, 1,000 ,, ... ... ... | 3 | 0 0 |
| Ditto of 1,000 ,, 2,000 ,, ... ... ... | 4 | 0 0 |
| Ditto of 2,000 and upwards ... ... ... | 5 | 0 0 |

*For First Entry of the Notification "L.M.C." in the Register Book.*

| | | |
|---|---|---|
| For each Ship under 100 registered HP. ... ... ... ... | £1 | 0 0 |
| Ditto of 100 and under 300 HP. ... ... ... | 2 | 0 0 |
| Ditto of 300 and above ... ... ... ... | 3 | 0 0 |

### II.

OFFICE OR REGISTRATION FEES.

*Chargeable on Vessels surveyed, for other than First Entry, &c., under the above Scale I., by the Society's Non-Exclusive Surveyors.*

| | | |
|---|---|---|
| For each Ship under 500 Tons ... ... ... ... ... | £0 | 10 0 |
| Ditto of 500 and under 1,000 Tons .. ... ... | 1 | 0 0 |
| Ditto of 1,000 ,, 2,000 ,, ... ... ... | 1 | 10 0 |
| Ditto of 2,000 and upwards ... ... ... ... | 2 | 0 0 |

## SPECIAL SURVEYS.

**Section 28.** 1. For ships built under the special superintendence of the Surveyors (to entitle them to the distinctive mark ✠), 1s. per ton for the first 1,000 tons, and 6d. per ton for every ton beyond 1,000 tons.

2. For machinery or new boilers built under the special superintendence of the Surveyors (to entitle them to the distinctive mark ✠ in red).

3. For engines and boilers up to 200 registered horse-power, 3 shillings per horse-power. For engines over 200 horse-power, 3 shillings for the first 200 horse-power, and 1 shilling per horse-power above 200. No fee to be less than £8 0s. 0d.

4. For the survey and testing of Donkey Boilers, a fee of two guineas to be charged.

5. For Surveys for damage, or for other Surveys, held at the request of the Owners, and for the Survey of Ships for Restoration, Continuation, or the character A in Red, or otherwise under the Society's rules, a charge (in addition to the Fee for entry) will be made, according to the nature and extent of the service performed.

6. In cases where the caulking of ships is superintended and tested by the Surveyors, a special charge will be made, according to the tonnage of the ship.

7. All repairs which may be required on the Surveys above referred to, must be performed under the superintendence of the Society's Surveyors. (*See also* Section 22.)

MEM.—It is to be understood that in all cases where travelling expenses are incurred by the Surveyors in connection with the above services, they are to be defrayed by the parties interested in the same.

**Section 29.** Certificates of Character, on the Form No. 7, *or* of "L.M.C.," *or* "B.&M.S.," on Forms Nos. 10 or 11, signed by the Chairman, the Deputy-Chairman, or the Chairman of the Sub-Committee of Classification, and countersigned by the Secretary, will be granted on application, the charge for which will be as follows:—

| | | | | | | |
|---|---|---|---|---|---|---|
| For Characters of Ships under 200 Tons ... ... ... ... | £0 | 2 | 6 | each |
| Ditto of 200 ,, and above ... ... ... | 0 | 5 | 0 | ,, |
| For L.M.C. or B.&M.S. of vessels under 150 HP. ... ... ... | 0 | 2 | 6 | ,, |
| Ditto Ditto of 150 HP. and above ... ... | 0 | 5 | 0 | ,, |
| Copies of original reports, as per Section 19 ... ... | 1 | 1 | 0 | ,, |

**Section 30.** Rules, complete, 10s. each copy. If for Wood Ships and Composite Ships alone, 5s. If for Iron Ships alone, 5s.

# RULES FOR THE BUILDING AND CLASSIFICATION OF IRON SHIPS.

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# RULES
FOR
# THE BUILDING AND CLASSIFICATION OF IRON SHIPS.

IRON vessels will be classed A with a Numeral prefixed, so long as, on careful annual and periodical Special Surveys, they are found to be in a fit and efficient condition to carry dry and perishable cargoes of and from all parts of the world. (*See* N.B. at foot.)

100A, 90A, and 80A, will denote vessels that have been built in accordance with, or equal to, the Rules, and Tables G 1 to G 6. Deviations from the Rules will be allowed, provided that a sketch of the midship section, plans, &c., in each case, showing the proposed scantlings and arrangements, be *first* submitted through the resident Surveyors, and approved by the Committee; and, that the vessels be built in accordance with the approved plans, under the Survey of the Surveyors of this Society.*

Vessels which do not fulfil all the requirements for the 100A class, but which are superior to those built on the 90A scale, may, if the Committee approve, be classed 95A; those not equal to the 90A, but superior to the 80A, may be classed 85A; and those which in some respects are deficient of the requirements of the 80A scale, but fit for the A class, may be classed 75A.

Vessels which are built for special purposes, and which are considered fit for such purposes, although not eligible to be classed for the conveyance of dry and perishable cargoes to and from all parts of the world, may be classed A, provided all the details of the scantlings and arrangements be submitted to the Committee for approval.

To the class A in such cases will be affixed a designation, showing the particular trade or purpose for which the vessels are intended, thus:—A "For River purposes only." A "For Tug purposes. A "Fishing Smack." A "For Channel purposes."

In the latter vessels, the particular Channel purposes intended are to be defined thus "Bristol Channel," "Irish Channel," "English Channel," "Newhaven—Dieppe," &c.; and all vessels classed for Channel purposes must have a minimum freeboard, as required in awning-decked vessels, to be submitted for the approval of the Committee.

All vessels to be submitted to occasional or annual Surveys when practicable. To entitle them to retain their characters in the Register Book, the following Special Surveys must be held periodically. At the time of any survey, the comparative numeral will depend on the thickness of the plating and angle iron, and the general condition of the vessel.†

*N.B.—It is to be distinctly understood that the numerals prefixed to the letter* A *do not signify terms of years, but are intended for the purpose of comparison only; the* A *character assigned being for an indefinite period, subject to annual and periodical Surveys as follows.*

* In vessels building, or to be built, under contract for classification, deviations from the Rules will not be allowed by the Committee, unless the Builder shall previously obtain the sanction of the Owner.

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage or from other causes, rests with the Owners, Masters, or Agents.*

† *Expunging or withdrawal of character.—The twelfth, thirteenth, and fourteenth Columns, left blank, indicate that the Vessel has never been Classed in the Register Book. Three dots . . . in Column* 13 *indicate that the vessel was at one time Classed by this Society, but that the Class has been withdrawn at Owner's request. A black line with date under it in Column* 14 *indicates that, at that date, the Vessel,* from reported defects, *was not entitled to a Character in the Register Book. A red line with date under it in this Column indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules.*

***Survey No. 1.**—The vessel to be placed on blocks of sufficient height, in a dry dock, or on ways, the limber boards and ceiling equal to one strake fore and aft on each side removed,§ and both surfaces of outside plating exposed.†

In Steam Vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. For periodical Surveys of Engines and Boilers, *see* pages 20 & 21.

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom and the tanks tested by a head of water to the height of the light water-line to test their efficiency. Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

***Survey No. 2.**—The vessel is to be placed on blocks of sufficient height, in a dry dock, or on ways; the limber boards and ceiling equal to *three* strakes fore and aft on each side removed,‡ and both surfaces of outside plating exposed.†

The windlass at this and all subsequent alternate special surveys to be unhung, where necessary, and its wood linings sufficiently stripped, for examination. The chain cables are also to be ranged for inspection.

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* pages 20 & 21.)

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency. Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

After a vessel has passed No. 3 Survey, in addition to the survey prescribed for No. 2, when that survey becomes due, ceiling should be lifted at other parts of the vessel where deemed necessary by the Surveyors to enable them to satify themselves as to the condition of the vessel.

**Survey No. 3.**—To be held by two Surveyors, one to be an exclusive officer of the Society.—The vessel to be placed on blocks of sufficient height, in a dry dock, or on ways; proper stages to be made and the hold to be cleared; all the close ceiling in the hold to be removed. so that the rivets, plates of keel, and flat of bottom may be thoroughly examined; coal-bunkers of steam-vessels to be cleared, the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulk-heads, rivets and inner surface of the plating to be exposed, and where side lights are fitted, the condition of the plating in way of the same to be ascertained. All oxidation te be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem,

* To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

† In cases where the inner surface of the bottom plating is coated with cement, or asphalte, if the coating be carefully inspected and tested, by beating or chipping, and found sound and adhering satisfactorily to the iron, its removal may be dispensed with.

‡ In the case of vessels fitted with double ceiling, application may be made to the Committee if any relaxation be required.

sternpost, and rudder; the plankshеers and waterways, if of wood, to be scraped bright. When the vessel is thus prepared, the Surveyors, if they deem necessary, are to ascertain the thickness of the plating by having holes drilled.*

Such parts as may be found defective, or less than three-fourths of the required substance by Rule are to be removed and replaced with proper materials, equal in substance and quality to the original construction.† The plankshеers, waterways, flat of decks and their fastenings, are also to be examined and made good where necessary.‡

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* pages 20 & 21.)

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom and the tanks tested by a head of water to the height of the light water-line to test their efficiency. Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

Upper decks must be renewed when reduced in thickness as follows, viz.:—When a deck originally 4 inches thick is worn to 3 inches, $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches, 3 inches to $2\frac{1}{2}$ inches.

Every vessel which has been classed from 100A to 90A inclusive, must be submitted to a special periodical survey every four years;—the first according to No. 1; the second according to No. 2; the third according to No. 3; and afterwards according to Nos. 1, 2, and 3 consecutively, at intervals of four years.§

Vessels classed 85A and under must be subjected to a special survey every *three* years, as per Nos. 1, 2, 3, and afterwards as per Nos. 1, 2, and 3 consecutively.

In all vessels classed 90A and above, No. 3 Survey must be complied with before the expiration of *thirteen* years from the date of build or the previous No. 3 Survey. In vessels classed 85A and under, No. 3 Survey must be complied with before the expiration of *ten* years from the date of build or the previous No. 3 Survey.

Vessels which have undergone either of the foregoing examinations, will be noted in the Register Book, thus:—*s.s.No.* 1—85, *s.s.No.* 2—85, *s.s.No.* 3—85, indicating the special survey and date thereof; and any vessel having passed the time when the foregoing surveys have become due, and not being marked as above in the Register Book, will be liable to have her character suspended.

At each of these Special Surveys of vessels propelled by steam, the machinery and boilers are to be examined by the Engineer-Surveyors, and reported upon to the Committee as to their safety and efficiency.

Whenever the engines or boilers are taken out, the bearers, with the floor-plates, keelsons, rivets, &c., under them may, at the request of the Owners, be surveyed in anticipation of the above Rule; and whenever the bottom plating is to be cemented a survey is to be held prior to the cement being laid.

* In cases where the inner surface of the bottom plating is coated with cement, or asphalte, if the coating be carefully inspected and tested, by beating or chipping, and found sound, and adhering satisfactorily to the iron, its removal may be dispensed with.

† Where the deterioration in thickness is widespread, and it is not deemed advisable by the owner to renew the material, on a detailed report being made by the resident Surveyor, the class of the vessel will be reconsidered.

‡ To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

§ Should a ship at any time be submitted to Special Survey No. 3 before being 12 years old, the subsequent Special Surveys may be Nos. 1, 2, and 3, consecutively, dating from the completion of such No. 3 Survey.

## SURVEYS WHILE BUILDING.

### SPECIAL SURVEY.

The Surveyors are to examine during the progress of a vessel, the materials and workmanship, from the laying of the keel to her completion; and to point out as early as possible anything that may be objectionable.

In steam vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

### ORDINARY SURVEY.

1st. On the several parts of the frame, when in place complete, and before any plating is wrought.

2nd. On the plating, during the progress of riveting.

3rd. When the beams are in and fastened, before the decks are laid.

4th. When the vessel is complete, but before the plating is finally coated or cemented.

5th and last. After the vessel is launched and equipped.

### SURVEY OF MACHINERY.

In vessels propelled by steam the machinery and boilers are to be inspected throughout construction, the boilers tested by hydraulic pressure, and the machinery tested under steam. Machinery certificates will be granted, and notifications thereof made in the Register Book, thus: "LMC. 3,85" *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE, March, 1885). (*See* Section 39.)

In cases of machinery or new boilers being built under Special Survey, the distinguishing mark ✠ will be noted in red, thus: "✠L.MC.," or "✠N.E.&B.," or "✠N.B."

### SPECIAL SURVEY OF NEW ENGINES OR BOILERS.

The Surveyors are to examine the materials and workmanship from the commencement of the work until the final test of the machinery under steam; any defects, &c., to be pointed out as early as possible.

The Surveyors may also, if desired, compare the work as it progresses with the requirements of the specification agreed upon by the parties concerned, and certify to the conditions thereof, as far as can be seen, being satisfactorily complied with.

### ORDINARY SURVEY OF NEW ENGINES OR BOILERS WILL BE AS FOLLOWS.

1. On the different parts of the engines during erection.
2. On the sea connections while being fitted to the vessel.
3. On the boiler plates when they are bent, flanged and holed, ready for riveting, and on stays, &c., while being fitted.
4. Testing the boilers by hydraulic pressure.
5. When engines and boilers are being fixed on board the vessel.
6. At the setting and testing of safety valves and trying the machinery under steam.

### PERIODICAL SURVEYS OF MACHINERY. ENGINES AND BOILERS. (*See* N.B. at foot.)

1. The machinery and boilers of all steam ships are to be surveyed annually if practicable, and in

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

addition are to be submitted to a Special Survey every four years upon the occasion of the vessels undergoing the Special periodical Surveys Nos. 1, 2, and 3, prescribed in the Rules.

2. At these Special Surveys the propeller, stern-bush, and fastenings of the sea connections are to be examined while the vessel is in dry dock, and, if deemed necessary by the Surveyors, the stern shaft is to be drawn and examined at least once in four years, and more frequently if deemed necessary by the Surveyors.

3. The cylinders, pistons, slide valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

4. The sea connections and arrangements of cocks, pipes, bilge-suctions, roses, &c., are to be examined.

5. The boilers and superheaters are to be examined internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure ; the safe working pressure is to be determined by their actual condition.

6. The safety valves are to be examined and set to the safe working pressure.

7. If satisfactory, these Surveys will be recorded in the Register Book thus :—"LMC. 5,85" *in red;* or "B&MS. 5,85" *in red.*

8. "LMC." (LLOYD'S MACHINERY CERTIFICATE), with a date, denotes that the machinery and boilers are fitted in accordance with the Ruleand s, were found upon examination at that time to be in good condition.

9. "B&MS." (BOILERS AND MACHINERY SURVEYED), with a date, denotes that the boilers and machinery, though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

10. In the event of either the machinery or boilers appearing to be impaired to such an extent as renders it desirable that either or both be specially surveyed within the periods prescribed above, a Certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

## BOILERS.

11. The boilers of all steam ships are to be specially surveyed when six years old, and subsequently they are to be specially surveyed annually.

12. At these surveys the boilers and superheaters are to be examined internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure ; the safe working pressure is to be determined by their actual condition.

13. The safety valves are to be examined and set to the safe working pressure.

14. If satisfactory, these surveys will be recorded in the Register Book thus : "B.S.5,85" *in red.*

15. "B.S." (Boilers Surveyed), with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

16. In the event of the boilers appearing to be impaired to such an extent as renders it desirable that they be specially surveyed within the periods prescribed above, a Certificate for a limited period will be granted according to the nature of the case.

## RULES FOR THE BUILDING OF IRON VESSELS.

**Section 1.** 1. The scantlings given in Tables G 1, G 2, and G 3, are intended for vessels the

length of which does not exceed *eleven times* their depth, *from the top of keel.* Where this proportion is exceeded, *see* Sec. 46.

2. For proportions of breadth to length, *see* Table G 4.

3. The measurements for regulating the proportions are to be taken as follows :—

### LENGTH.

4. The length to be measured from the after part of the stem to the fore part of the sternpost, on the range of the upper deck beams, in one, two, and three-decked and spar-decked vessels, but on the range of main deck beams in awning-decked vessels.

5. In vessels where the stem forms a cutwater, the length is to be measured from the place where the upper deck beam line would intersect the after edge of stem if it were produced in the same direction as the part below the cutwater.

### BREADTH.

6. The breadth is in all cases to be the greatest moulded breadth of the vessel.

### DEPTH.

7. The depth in one and two-decked vessels is to be taken from the upper part of the keel to the top of the upper deck beam amidships. In spar-decked vessels and awning-decked vessels, the depth is to be taken from the upper part of the keel to the top of the main deck beam amidships. For three-decked vessels *see* Section 41.

### SCANTLINGS.

**Section 2.** 1. The scantlings of the frames, reversed frames, and floor-plates, the thickness of bulk heads and the diameter of pillars in Table G 1, are regulated by numbers, which are produced as follows

2. *For one and two decked vessels.*—The number is the sum of the measurements in feet, arising from the addition of the half-moulded breadth of the vessel amidships, the depth from the upper part of the keel to the top of the upper deck beams, and the girth of the half midship frame section of the vessel, measured from the centre line at top of keel to the upper deck stringer plate.

3. *For three-decked steam vessels.*—The number is produced by the deduction of seven feet from the sum of the measurements taken to the top of the *upper* deck beams. (*See* Section 41.)

4. *For spar-decked vessels and awning-decked steam vessels.*—The number is the sum of the measurements in feet, taken to the top of the main deck beam, as described for vessels having one or two decks.

5. The scantlings of the keel, stem, sternposts, keelson and stringer plates, the thickness of the outside plating and deck; also the scantlings of the angle irons on beam stringer plates, and keelson and stringer angle irons in hold, as in Tables G 1, G 2, and G 4, are governed by the number obtained by multiplying that which regulates the size of the frames, &c., by the length of the vessel.

### QUALITY OF IRON.

**Section 3.** 1. The whole of the iron to be of a good malleable quality, capable of withstanding a tensile strain of 20 tons per square inch with, and 18 tons across, the grain, and to be subjected to tests at the discretion of the Surveyors. Brittle or inferior material to be rejected.

2. All plate, beam, and angle iron to be legibly stamped in two places with the manufacturer's name or trade mark, and the place where made, which is also to be stated in the report of survey.

## WORKMANSHIP.

**Section 4.** The workmanship to be well executed, and submitted to the closest inspection, and amended where necessary before coating or painting: it is not intended to prevent the coating of the plates *inside* in the way of the frames.

## KEEL, STEM, STERN, AND PROPELLER POSTS, AND TRANSOMS.

**Section 5.** 1. The keel, stem, stern, and propeller posts are to be either scarphed or welded together, and to be in size according to Table G 1; if scarphed, the length of scarphs to be nine times the thickness given in the table for keels; and the rivet holes required in the *thin* ends of them are recommended to be drilled after the scarphs are fitted.

2. Where the garboard strakes are thicker than required by the Rules, the thickness of the keel may be proportionately reduced.

3. Where the keel and keelsons are made of several thicknesses of plates, the plates that form the keel to be in thickness, taken together, the same as is required for a solid keel, as per Table G 1; and the butts of the several plates of which the keel is formed to be carefully shifted from each other.

4. When **Hollow or flat keel plates** are adopted, their breadth must be the same as given for the garboard strakes, and their thickness not less than once and a third that prescribed for those strakes, for three-fifths the vessel's length amidships. The plates before and abaft this length may be gradually reduced to the thickness of the garboard strakes amidships; and the strake of plating on each side adjoining the flat keel plates to be of the thickness required for the garboard strakes in Table G 1.

5. Where flat plate keels are used, intercostal keelson plates, or centre through-plates, must be fitted close down on the keel, and connected to it by double angle irons of the dimensions given for keelson angle irons in Table G 2, riveted all fore and aft to the keel and keelson. (*See* also Section 9, paragraph 6.)

6. The butt-straps of flat keel plates are to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted.

7. The stem at its lower part is to be the same moulding as the keel, and attached to it by a scarph of the same length as the keel scarph; it may be gradually reduced from the height of the load-line to its head, where it may be three-fourths of the sectional area given in Table G 1.

8. The stern and propeller posts, and after end of keel, for single screw propelled vessels, to be of the size given in Table G 1, for stern frames, or of equal sectional area; the portion adjoining the keel to be tapered fair into it. In a sailing vessel, or paddle steamer, the sternpost may be reduced from the lower part of the rudder trunk to its head, where it may be three-fourths of the sectional area given in the Table; and, in a steam vessel having a propeller frame, it may be reduced at the head to the size given for stems in Table G 1.

9. The portion of the forging of the stern frame, forming part of the keel, is to extend sufficiently forward for the after end of its scarph *in sailing vessels and paddle steamers* to be at least once and a half the frame space before the sternpost, and *in screw propelled vessels* at least twice and a half the frame space before the propeller post.

10. The sternpost is to be extended well above the counter, and securely attached at its head to an iron deck or plate, and to a transom plate which should not be less in depth than once and a half the depth of the midship floor-pate, and of the same thickness. And in screw steamers whose plating number is

20,000 and above, the foremost or propeller post should extend sufficiently above the arch of the propeller frame to be efficiently connected to iron plating on the beams, and to a deep transom plate. (*See* Section 7, paragraph 7.)

11. The rudder braces are to be forged on the sternpost, and spaced from 4 ft. to 5 ft. 6 in.

## FRAMES.

**Section 6.** 1. The frames to be of the dimensions set forth in Table G 1; to be in as great lengths as possible, fitted close on to the upper edge of the keel; and at the extreme ends of the vessel the lower parts of the frames opposite to each other are to be lapped and riveted together; and in all vessels to extend to the gunwale. Where either raised quarter-decks, poops, or forecastles, are constructed, the frames are to extend to their deck stringers respectively, except when constructed of a rounded form at the gunwale; they may then terminate at the lower part of the curve.

2. When the frames are butted on the keel they are to have not less than three feet lengths of corresponding angle iron, fitted back to back, to cover and support the butts and receive the plating for at least three-fourths the vessel's length amidships. Similar pieces of angle iron are to be fitted, if the frames are butted elsewhere.

3. The rivet holes to be punched through from the faying surfaces of the frames, and they are not to be punched at the turn of the bilge until the frames are bent to the required shape; the holes in the way of the lands of the plating are to be drilled after the plating is wrought.

4. The spacing of the frames from centre to centre to range from twenty to twenty-six inches, according to the size of the vessel, which spacing should not be exceeded around the stern of the vessel at the knuckle. (*See* Table G 1.)

## FLOOR-PLATES.

**Section 7.** 1. The floor-plates to be in size at the middle line according to Table G 1, for half the length amidships, excepting under the engines and boilers in steam vessels, where they must be one-sixteenth of an inch thicker, when the thickness prescribed in Table G 1 is nine-sixteenths of an inch or under.* They are to be moulded not less than one-half their midship depth† at a distance of three-quarters the half breadth of the vessel set out from the middle line on the run of the frame, and not less at their extreme ends than the moulding of the frames; and they are to extend in a fair curve well up the bilges, in no case terminating lower at the outside of the frame than a perpendicular height of twice the midship depth of the floor above the top of keel. The ends of the floors to maintain the height prescribed, for one quarter of the vessel's length amidships, they may then be *gradually* lowered forward and aft until the upper edges of the floor-plates are level (this place to be determined by the form of the vessel), from which to the ends they are to be gradually increased in depth, so as to efficiently connect the sides; the upper parts of the floors forward and aft are to be high enough to give ample room between the reversed frames, on each side of the vessel, for fitting the keelson angle irons. (*See* also Section 26, Paragraph 2.)

2. The thickness of the floor-plates for half the vessel's length amidships to be as given in Table but for one quarter of her length at each end they may be reduced in thickness one-sixteenth of an inch

* Where a double bottom extends through the engine and boiler space, the floors need not be increased in thickness provided the top plating of the double bottom be increased one-sixteenth of an inch in thickness.

† In vessels of unusual form, in which it may be considered desirable to depart from this condition, the approval of the Committee must be obtained thereto.

when the plates amidships are six-sixteenths and above ; and when the plates amidships are nine-sixteenths in thickness, and above, they may be reduced one-sixteenth of an inch for an eighth of the vessel's length before and abaft the half-length amidships, and the remainder may be two-sixteenths of an inch less in thickness than the midship floors.

3. A floor-plate to be fitted and riveted to every frame, and to be extended across the middle line, except where a vertical centre-plate is adopted, in which case the floor-plates are to be efficiently connected to it on each side by double vertical angle irons of not less size than the reversed frames.

4. When floors are made in two lengths, the butts are to be well fitted, and to have double butt-straps treble riveted ; or, the floor-plates may be lapped and treble riveted.

5. Floor-plates to which the bulkheads are attached must be deeper than the adjacent floor-plates, to admit of the bulkheads being riveted to them above the reversed angle irons.

6. WATERCOURSES are to be formed above the frames through all the floor-plates, on each side of the middle line, also at the lower turn of the bilges in vessels of full form, as well as through the vertical centre-plate, and intercostal keelsons, when such keelsons are adopted, so as to allow water to reach the pumps freely.

7. TRANSOM-PLATES are to be fitted and connected to the frames, and to the sternpost so as to efficiently support the counter. (*See* Section 5, paragraph 10.)

## REVERSED ANGLE IRONS ON FRAMES.

**Section 8.** 1. Reversed angle irons on frames to be in size as per Table G 1.

2. Vessels where the number for regulating the size of the frame is below 45, to have reversed angle irons riveted to every frame and floor-plate, extending across the middle line to the upper part of the bilges.

3. Vessels where the number, as per Rule, is 45 and below 57, to have reversed angle irons riveted to every alternate frame and floor-plate, extending across the middle line to the upper part of the double angle iron stringer above bilges, and on the remaining floor-plates and frames to the gunwale ; or, if the vessel is of a depth to require hold beams, the reversed angle irons are to extend to the upper part of the hold beam stringer angle iron and gunwale alternately.

4. All vessels, except those having an awning-deck, where the number, as per Rule, is 57 and upwards, to have reversed angle iron on every frame, extending alternately to the upper deck stringer plate, and top of angle iron on stringer plate next below it. In awning-decked vessels they are all to extend to the upper part of the main deck stringer angle iron.

5. In *sailing vessels* where the number, as per Rule, is 75 and upwards, the reversed frames are to extend to the gunwale on every frame.

6. Double reversed angle irons to be fitted on every floor, extending from bilge to bilge, in the engine and boiler spaces of steam vessels ; and, where the vessel is of 15 feet depth or above from the hold beams, or where the number for plating is 15,000 or above, they are to extend sufficiently high to admit of the stringer at upper part of bilge being connected to them. Short double reversed angle irons are also to be fitted on all frames in way of the keelsons and stringers in hold.

7. The butts of reversed angle irons, excepting those at middle line, to be secured with butt straps, having not less than two rivets on each side of the butt.

8. The rivets for securing the reversed angle iron to the frames and floor-plates to be in diameter in

proportion to the greatest thickness of angle, or plate iron, through which they pass, as specified in Table G 1, and to be spaced eight times their diameter, from centre to centre.

9. In vessels where the plating number is 20,000 and above, reversed angle irons should be fitted to every frame to the height of the upper, spar, or awning deck abaft the after peak bulkhead; and in addition where such vessels have broad flat counters, a double angle iron stringer should be fitted midway between the middle, and upper, spar, or awning deck beams for a reasonable length, connected by plate knees to the transom plate; or other additional strengthening applied, as the Surveyors may deem necessary.

## MIDDLE LINE KEELSONS.

### MIDDLE LINE SINGLE PLATE KEELSON.

**Section 9.** 1. The middle line keelson, if of single plate, and standing above the floor-plates, to be of the size prescribed in Table G 2, and to have angle irons, of the dimensions given in the same Table, fitted and riveted on its upper and lower edges. In addition there is to be a rider plate, on the top of the keelson plate, extending over *three-fourths* of the length of the vessel amidships, riveted to the angle irons, the breadth of which is to be equal to the sum of the two broad flanges of the keelson angle irons together with the thickness of the centre plate it covers; the thickness of the rider plate not to be less than prescribed in Table G 2. The butts of the plates and angle irons forming this keelson to be properly shifted, and to be efficiently butt-strapped.

2. The butts of the vertical plate to be secured with double butt-straps, each not less than two-thirds of the thickness of the plates they connect, and to be treble riveted; the butt-straps of the rider plate to be fitted on the upper side, and to be treble riveted; the butt-straps of the angle irons to be of sufficient length to have not less than three rivets properly arranged on each side of the butt.

3. Vessels in which the number for plating is 33,000 and above, are to have a foundation plate not less than eighteen inches broad and ten-sixteenths of an inch thick fitted on the top of the floors under the middle line plate keelson.

### MIDDLE LINE BOX KEELSON.

4. If a box keelson be adopted, it is to be formed of plates, properly shifted, of the thickness given in Table G 2, with a foundation plate; the depth to be the same as that prescribed for single plate keelsons; the angle irons to be of the size given in Table G 2. The box is to maintain its depth for half the vessel's length amidships, it may then be gradually reduced to two-thirds of the same at the extreme ends.

### MIDDLE LINE INTERCOSTAL KEELSON.

5. If a middle line intercostal keelson be adopted, the plates are to be of the thickness prescribed in Table G 2, and riveted to vertical angle irons of not less size than the reversed frames, to be fitted and attached to all floor-plates; the intercostal plates to extend from the keel to the top of the floors, and to be fitted close to them. A bulb plate, at least two inches deeper than required for the main deck beams, is to be let down below the top of the floors, between the reversed angle irons, sufficiently for the intercostal plates to be riveted thereto, and the bulb to be fitted between, and riveted to, two longitudinal angle irons on the floors, extending all fore and aft, of the size given for keelson angle irons in Table G 2; or, the letting down of the bulb plate may be dispensed with, if the intercostal plates are extended to the upper edge of the longitudinal angle irons.

6. When intercostal keelsons are adopted with hanging keels, in vessels where the number for plating is 13,000, and under 18,000, instead of a bulb plate there is to be a centre vertical plate let down and

attached to the intercostal plates below the top of floors, having double continuous angle irons at top and bottom, and a rider plate on its upper edge, of the sizes given in Table G 2; the vertical plate and the rider plate are to be of the thickness required for stringer plates in upper line of Table G 4, and the depth above the floors to be sufficient to admit of the angle irons being properly fitted. When the number is 18,000 and above, the vertical plate and the rider plate are to be of the thickness given in Table G 2 for main keelsons, and the depth of the vertical plate above the floors to be not less than three-fourths of that given in the said Table

7. Where **Flat plate keels** are used, intercostal keelson plates, or centre through-plates, must be fitted close down on the keel, and connected to it by double angle irons of the dimensions given for keelson angle irons in Table G 2, riveted all fore and aft to the keel and keelson. In vessels where the number for plating is 13,000 and under 15,000, or where the length exceeds ten times the depth, instead of a bulb plate, there is to be a centre vertical plate let down and attached to the intercostal plates below the top of floors, or connected to the centre through-plate, having double continuous angle irons at top and bottom, and a rider plate on its upper edge; the vertical plate and the rider plate are to be not less in thickness than that given in the upper line of Table G 4 for stringer plates, and the depth above the floors to be sufficient to admit of the angle irons being properly fitted. Where the number is 15,000 and above, the vertical plate and the rider plate are to be of the thickness given in Table G 2 for main keelsons, and the depth of the vertical plate above the floors to be not less than three-fourths of that given in the said Table. Where the number is 26,000 and above, the flat-plate keel should be doubled for one-half the vessel's length amidships.

## CENTRE THROUGH-PLATE KEEL AND KEELSON.

8. If the middle line keelson be formed of a centre through-plate, extending from the lower edge of the keel to the top of the floors, it must be two-sixteenths of an inch thicker than that required in Table G 2 for intercostal keelsons. To strengthen the floor-plates transversely at their intersection at the middle line, in addition to the double vertical angle irons riveted to their ends and to the centre plate keelson, there is to be a flat keelson plate, of the same thickness as, and not less than three-fourths the breadth of, the garboard strakes in Table G 1, riveted to double reversed angle irons on the upper edge of floors, and to two fore and aft angle irons on the upper edge of the centre through-plate keelson; and where the number for plating is 15,000, and under 18,000, there is to be a bulb plate of the size of the main deck beams, fitted between, and riveted to, two longitudinal angle irons of the size for keelson angle irons in Table G 2, connected to flat plate keelsons and double reverse bars on top of floors. But, should the centre through-plate keelson be extended above the upper edge of the floors, then it is to be connected by two fore and aft angle irons, of the size given in Table G 2, to two flat plates, one on each side of the middle line, to be one-sixteenth of an inch thicker than that given for intercostal plates, and one-third the breadth of the garboard strakes, to be well riveted to the double reversed angle irons on the upper edge of the floors. Where the number is 18,000 and above, the centre through-plate keelson is to extend sufficiently high above the floor-plates to take two pairs of double angle irons of the size given for keelson angle irons, and there is to be a rider plate fitted on the top of the thickness of the keelson plate.

9. In all cases the middle line keelson is to be extended as far forward and aft as practicable.

## BILGE KEELSONS, AND STRINGERS IN HOLD.

**Section 10.** 1. All vessels to have bilge keelsons, extending all fore and aft, and placed at the lower turn of the bilges, formed of double angle irons fitted back to back, of the size given in Table G 2.

2. If the vessel has but a single tier of beams and her number in Table G 2 is under 7,200, a side stringer, formed of the same size angle irons, is to be fitted about midway between the bilges and upper deck, extending all fore and aft.

3. Where the number is 7,200 and above, and the vessel is under 14 feet depth of hold, two double angle iron stringers are to be fitted on each side between the bilge keelsons and the deck beams, the upper pair to extend three-fifths of the vessel's length amidships, and the lower pair to extend all fore and aft, to be riveted back to back and to double reversed angle irons on the frames; the size of them not to be less than those used for the middle line keelson.

4. For stringers in hold, *see also* Section 14.

## SIDE KEELSONS.

**Section 11.** 1. In vessels where the number in Table G 2 is 13,000, and under 15,000, a double angle iron keelson is to be fitted on each side, as far forward and aft as practicable, and to be placed about midway between the middle line and bilge keelsons.

2. Where the number is 15,000, and upwards, intercostal plates are to be fitted on each side, as far forward and aft between the floors as practicable, and to be placed about midway between the middle line and bilge keelsons; these plates are to be fitted close to the floors, and to be attached to the outside plating with an angle iron of not less size than $3 \times 3 \times \frac{7}{16}$, but, if the plating number is 21,700 or above, these angle irons must not be less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$; they are to extend to the top of the floors, and longitudinal plates, in long lengths of the same thickness as the intercostal plates, are to be let down and riveted to them. These plates are to be fitted between, and riveted to, two longitudinal angle irons of the size given for keelson angle irons; or the longitudinal plates may be dispensed with if the intercostal plates are extended to the upper edge of the longitudinal angle irons and riveted to them.

3. Side intercostal plates or side keelsons need not be fitted in the range of double bottoms; but where partial double bottoms are fitted, these keelsons are to extend into, or scarph the double bottom not less than three spaces of frames, and to be connected to the longitudinal girders where practicable.

4. Vessels not being of a size to require side intercostal keelson plates are to have washplates, of the thickness given for bulkheads in Table G 1, fitted between the middle line and bilge keelsons, for not less than half the vessel's length amidships.

## DETAILS RELATING TO KEELSONS AND STRINGERS.

**Section 12.** 1. Where bulb iron is used for keelsons or stringers, the joints to be overlapped and riveted, or otherwise efficiently connected; if overlapped, the length of lap must not be less than twice the depth of the bulb plate; iron of other form than bulb may be used for them, if of equal strength.

2. All angle irons for keelsons and stringers are to be in long lengths, properly shifted; and wherever butted to be connected with angle or plate iron, not less than two feet long, fitted in the throat of them, properly riveted to each flange. The thickness of the connecting plates not to be less than the thickness of the angle irons they connect.

3. In all cases the middle line, side, and bilge keelsons, and, where practicable, the stringers, are to be

carried fore and aft, continuously through the bulkheads, the latter being made watertight around them; and, where such parts of the ship are necessarily separated, the longitudinal strength is to be efficiently maintained, to the satisfaction of the Surveyors.

4. All middle line and intercostal keelson plates may be reduced in thickness forward and aft, to the same extent as allowed in the floor-plates; or the former may be proportionately reduced in depth at the ends of the vessel.

5. All keelson and stringer angle irons may be reduced one-sixteenth of an inch in thickness, when above seven-sixteenths of an inch amidships, for one-fifth the vessel's length at each end.

## BEAMS.

**Section 13.** 1. Beams are to be of the form and size given in Table G 3; or they may be composed of any other approved form, equal in strength.

2. The beams, at the ends of hatchways on spar and upper decks exceeding in length six spaces of frames, must be equal in size to those of the main or middle deck.

3. Strong beams in the machinery space of steamers must, in all cases, have double angle irons on their upper and lower edges.

4. In sailing ships where the length of the midship hold beam exceeds 39 feet, the hold beams should be one inch more in depth than prescribed in Table G 3, unless they be additionally pillared.

5. All beams to be well and efficiently connected or riveted to the frames, with bracket ends or knee-plates; each arm of knee-plates not to be less in length than twice and a half the depth of beams, and to be in thickness equal to the beams; and not more than two holes in each beam arm to be punched before the beam is in place. When the length of the midship upper deck beams *in sailing vessels* exceeds 36 feet, *the bracket knees to each tier of beams* are not to be less than three times the depth of the beam.

6. It is recommended that the round up of the beams of all weather decks should not be less than one quarter of an inch per foot of length of beam. In the case of awning-decked steamers, this amount of round-up will be assumed in determining the minimum freeboard, which is required for insertion in the Register Book.

7. The beams of the various decks, or of tiers of beams, are to be placed over each other. *For variations and reductions in sizes of beams at the ends of vessels, see Table G 3, and footnotes.*

8. If the beams of the several decks in steam vessels of 43 feet and upwards in breadth be supported by a double row of pillars stepped upon the side keelsons, the depth of the main and lower deck beams may be one inch less than given in Table G 3, and the depth of the upper deck beams in three deck vessels may be half an inch less than given in the Table. (*See* Section 15.)

## SPACING OF BEAMS, AND STRINGERS IN HOLD.

**Section 14.** 1. The spacing of beams, or the arrangement of stringers substituted for beams, is to be regulated by the *depth amidships*,* measured from the upper part of floor-plates of the depth given in Table G 1, to the top of the upper, spar, or awning-deck beams, excepting in awning-decked vessels of

* In vessels constructed with a double bottom extending all fore and aft, the depth for regulating the beams may be taken from the inner bottom, provided bracket frames be extended in a fair curve up the bilges to the same extent above the height of the inner bottom at the middle line, as required by the Rules for floors in vessels having single bottoms. For depth under raised decks *see* Section 45.

less than 15 feet depth of hold to the main deck, in which case the arrangement of stringers in hold, &c., is to be regulated by the depth of hold to the main deck. (*See also* Section 10, paragraphs 2 and 3.)

2. All upper deck beams and the middle deck beams of three-decked ships, and the main deck beams of spar and awning-decked ships, to be fastened to alternate frames.

3. **All** *Vessels under* 12 *feet in depth* are to have a double angle iron stringer extending all fore and aft, about midway between bilge keelson and deck beams, riveted back to back and to double reversed angle irons on the frames, or to single lug pieces of the size of the frames.

4. **All** *Vessels of* 12 *and under* 13 *feet in depth* to have, in addition to the foregoing, bulb iron of the size required for their deck beams, riveted between the continuous double angle iron stringer for three-fifths the vessel's length amidships; or the bulb iron may be dispensed with, provided that, in lieu thereof, intercostal plates in long lengths be fitted between the double angle iron stringer, and attached by single angle iron to the outside plating.

5. **All** *Vessels of* 13 *and under* 14 *feet in depth* to have, instead of the bulb iron, as described above, a plate not less than 12 inches wide and $\frac{7}{16}$ thick, with double angle irons fitted on the inner edge the size of the keelson angle irons, and extending all fore and aft, and supported by brackets at every third frame.

6. **All** *Vessels of* 14 *feet depth and above* to have a double angle iron stringer of the size given in Table G 2, extending all fore and aft at the upper turn of the bilge on each side.

7. **All** *Vessels of* 14 *and under* 15 *feet in depth* to have hold beams of extra strength, as given in Table G 3, fastened to every tenth frame, with a stringer plate of the size given in Table G 4 for hold beam stringers, attached to the plating and supported by brackets at every alternate frame between the beams, and secured to the beams by efficient gusset plates.

8. **All** *Vessels of* 15 *and under* 16 *feet in depth* to have hold beams of extra strength, as given in Table G 3, fastened to every *tenth* frame, with a stringer plate on them attached to the side plating of the size given in Section 16, and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate. On the inner edge of the stringer plate, between the beams, an angle iron is to be fitted, of the size given for keelson angle irons in Table G 2, with its deep flange vertical, and covering the ends of the bracket plates.

9. **All** *Vessels of* 16 *and under* 17 *feet in depth* to have hold or lower deck beams fastened to every second and fourth frame alternately, or they may have hold beams of extra strength, as given in Table G 3, fastened to every *tenth* frame, with an angle iron on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case.

10. **All** *Vessels of* 17 *and under* 18 *feet in depth* to have hold or lower deck beams fastened to every second and fourth frame alternately; or, they may have hold beams as described in the foregoing paragraph, fastened to every *tenth* frame, provided double angle irons, $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of the stringer plate with a face plate $\frac{7}{16}$ of an inch in thickness, and gusset plates at the beam ends.

11. Sailing Vessels *of* 18 *and under* 21 *feet in depth* to have hold or lower deck beams fitted to every alternate frame.

12. Sailing Vessels *of* 21 *and under* 22 *feet in depth* from the upper part of the upper deck beams, or *of* 14 *and under* 15 *feet* from the upper part of the hold or lower deck beams to the top of the floors,

to have the lower deck beams fitted to every alternate frame, and to have two double angle iron stringers extending fore and aft, between the bilge keelson and hold or lower deck beams, on each side.

13. SAILING VESSELS *of* 22 *and under* 24 *feet in depth* from the upper part of the upper deck beams, *or* 15 *and under* 16 *feet* from top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and to have, in addition to the above, bulb plates of the size of the hold beams fitted and riveted between each of the two side stringers in lower hold on both sides, to extend all fore and aft.

14. SAILING VESSELS of 24, and under 25 feet in depth, from the upper part of the upper deck beams, or 16 and under 17 feet in depth, from top of lower deck beams, to have, in addition to the foregoing, intercostal plates of the thickness given in Table G 2, attached to the outside plating, and fitted to the upper stringer, all fore and aft, and to the lower stringer from one quarter of the vessel's length aft, until it is incorporated with the panting stringer.

15. SAILING VESSELS *of* 25 *and under* 26 *feet in depth* from upper deck, or *of* 17 *and under* 18 *feet in depth* from top of lower deck beams, are to have the lower deck beams fitted to every alternate frame, and to have orlop stringer plates of the dimensions required for hold beam stringer plates in Table G 4 fitted and attached to the outside plating and reversed frames by angle irons of the size given in Table G 2. These stringers must be supported by bracket plates riveted to them, and to alternate frames; and upon the inner edge of the stringer plate an angle of the size of keelson angle irons, as per Table G 2, is to be fitted and riveted, so that its vertical flange may cover the ends of the bracket plates; or, if preferred, an additional side stringer to those required in the preceding paragraph may be fitted, formed of double angle irons, bulb, and intercostal plates attached to the outside plating and fitted all fore and aft.

16. SAILING VESSELS *of* 26 *and under* 27 *feet in depth* from the upper deck, or *of* 18 *and under* 20 *feet* from the top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and to have orlop beams of the size given on Table G 3 for "hold beams of extra strength" fitted to every *tenth* frame, or these beams may be *twelve* frame spaces apart, provided double angle irons, $4 \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of the stringer plate with their deep flange vertical, and with a face plate $\frac{8}{16}$ of an inch in thickness.

17. STEAM VESSELS *of* 18 *and under* 20 *feet in depth* to have hold beams fastened to every alternate frame; or hold beams of extra strength, as given in Table G 3, may be fitted to every *eighth* frame, provided an angle iron, of the size given for keelson angle irons in Table G 2, be fitted on the inner edge of the stringer plate, and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate; or these beams may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$, and a face plate, $\frac{8}{16}$ of an inch in thickness, be fitted on the inner edge of the stringer plate, with gusset plates as above.

18. STEAM VESSELS *of* 20 *and under* 21 *feet in depth* to have, in addition to the foregoing, an extra side stringer, formed of double angle irons of the size of the keelson angle irons, fitted between the hold beams and bilge stringer, extending as far forward and aft as practicable.

19. STEAM VESSELS *of* 21 *and under* 22 *feet in depth*, to have, in addition to the above, a bulb plate of the size required for hold beams, fitted between the double angle irons of each of the side stringers for half the vessel's length amidships.

20. STEAM VESSELS *of* 22 *and under* 24 *feet in depth* from the upper part of the upper deck beams, *or of* 15 *and under* 16 *feet* from the upper part of the lower deck beams to the top of the floors, to have the ower deck beams fitted to every alternate frame, and to have hold beams of extra strength, as given in Table G 3, fastened to every *tenth* frame, with a stringer plate on them attached to the side plating of the size given in Table G 4 for nold beam stringer plates; and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate; and on the inner edge of the stringer plate, between the beams, an angle iron is to be fitted, of the size given for keelson angle irons in Table G 2, with its deep flange vertical, and covering the ends of the bracket plates.

21. STEAM VESSELS *of* 24 *and under* 25 *feet in depth* from the upper deck, or 16 *and under* 17 *feet* from top of the middle deck beams, to have hold beams fastened to every second and fourth frame, alternately, or they may have hold beams of extra strength, as given in Table G 3, fastened to every *eighth* frame; and to have an angle iron on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case, or they may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of the stringer plate, with a face plate on them $\frac{7}{16}$ of an inch in thickness.

22. STEAM VESSELS *of* 25 *and under* 26 *feet in depth* from the upper deck, or 17 *and under* 18 *feet* from the top of the middle deck beams, to have hold or lower deck beams fastened to every second and fourth frame alternately; or they may have hold beams of extra strength, as given in Table G 3, fastened to every *eighth* frame, and to have an angle iron on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case, or these beams may be *ten* frame spaces apart, provided double angle irons, $4 \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of stringer plate with their deep flange vertical, and with a face plate $\frac{8}{16}$ of an inch in thickness.

23. STEAM VESSELS *of* 26 *and under* 28 *feet in depth* from the upper deck, or 18 *feet and under* 20 *feet* from the top of the middle deck beams, to have hold or lower deck beams fastened to every alternate frame; or, if hold beams of extra strength, as given in Table G 3, be fitted, they may be fastened to every *eighth* frame, provided an angle iron, of the size given for keelson angle irons in Table G 2, be fitted on the inner edge of the stringer plate and gusset plates be fitted as in the previous case; or these beams may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $4 \times 4 \times \frac{8}{16}$, and a face plate $\frac{9}{16}$ in thickness be fitted on the inner edge of the stringer plate, with gusset plates at the beam ends.

24. STEAM VESSELS *of* 28 *and under* 30 *feet in depth* from the upper deck, or 20 *and under* 22 *feet* from the top of the middle deck beams, to have hold or lower deck beams fastened to every alternate frame, or if hold beams of extra strength, as given in Table G 3, be fitted, they may be fastened to every *eighth* frame, provided an angle iron of the size given for keelson angle irons in Table G 2, be fitted on the inner edge of the stringer plate, and gusset plates be fitted as in the previous case; or these beams may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $4 \times 4 \times \frac{8}{16}$, and a face plate, $\frac{9}{16}$ in thickness, be fitted on the inner edge of the stringer plate with gusset plates at the beam ends, and in addition a double angle iron stringer, of the size given for keelson angle irons in Table G 2, is to be fitted midway between the bilge stringer and the hold beams.

25. STEAM VESSELS *of* 30 *and under* 33 *feet in depth* from the top of the upper deck beams to the top of floors, or in which the depth from the top of the *lower* deck beams *is* 15 *and under* 18 *feet*, to have the

lower deck or hold beams fitted to every alternate frame, and to have below them an orlop stringer plate attached to the outside plating and reverse frames, of the thickness, and three-fourths of the breadth, of the lower deck stringer plates, supported by bracket plates riveted to them and to alternate frames; and upon the inner edge of the stringer plate an angle iron, of the size of keelson angle irons, as per Table G 2, is to be fitted and riveted, so that its vertical flange may cover the ends of the bracket plates; or a stringer of other form may be fitted, if approved by the Committee.

26. STEAM VESSELS *of* 33 *and under* 36 *feet in depth* from the top of the upper deck beams to the top of floors, or in which the depth from the top of the lower deck or hold beams *is* 18 *feet or above*, are to have the lower deck beams fitted to every alternate frame, and to have orlop beams, of the size given in Table G 3 for "hold beams of extra strength," fitted to every *tenth* frame, with stringer plates on them, and gusset plates at their ends.

27. Plans of all vessels above 36 feet in depth must be submitted for the consideration of the Committee, with a view to additional transverse strength being provided; and in all vessels where the height between decks is 8 feet or above, *at any* part, additional transverse strength at such part must be submitted for approval.

28. When the beams exceed two spaces of frames apart, a knee or bracket plate is to be riveted to alternate frames and to the stringer plate.

29. Notwithstanding the foregoing arrangements for the spacing of beams, whenever a deck is laid, the beams are not to be further apart than two frame spaces.

30. Where it is necessary, in consequence of long hatchways, engine-rooms, boiler spaces, &c., to dispense with some of the hold or lower deck beams, compensation must be made by fitting hold beams of extra strength, as given in Table G 3, with gusset plates, and angle irons, &c., on the stringer plates—regulated by the depth of the vessel, in accordance with the foregoing paragraphs of this Section.

31. If an arrangement differing from the foregoing in the spacing of the hold beams, to suit convenience of stowage, be required, a sketch showing beams and stringers of extra strength, or web frames, with all particulars, must be submitted through the Resident Surveyors, who are to state their opinion thereon, for the Committee's consideration.

## PILLARS.

**Section 15.** 1. All beams, for at least three-fourths the length of the vessel amidships, the alternate beams before and abaft this length, and all carlings of hatchways, exceeding in length six spaces of frames, to be pillared; in addition, the beams under deck houses, bowsprit, pall bitt, windlass, steam winches, and capstan are to be pillared, and wherever else the Surveyors may deem necessary; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper, spar, or awning deck, and to be of the sizes given in Table G 1. Where a vessel has three decks or tiers of beams, the size of the pillars to the middle tier is to be a mean between the sizes given in Table G 1.

2. In steam vessels of 43 feet and upwards in breadth, it is recommended that the beams be supported by a double row of pillars stepped upon the side keelsons, in which case the depth of the main and lower deck beams may be one inch less than given in Table G 3, and the depth of the upper deck beams in three deck vessels may be half an inch less than given in the Table. (*See* Section 13.)

3. All pillars to have solid welded heads and heels.

4. Pillars which extend from the keelson to the upper deck beams in vessels with two decks, or hold or beams; or to the middle deck beams in vessels with three decks, or tiers of beams; and the tiers pillars in sailing ships of 22 feet depth of hold and above, are to have their diameter increased by three-eighths of an inch beyond that given in Table G 1.

5. When split pillars are fitted for the purpose of securing shifting boards, each of the separate parts of the pillar where split should be made at least half an inch larger than the half of the single pillar required by the Rules, and the parts are to be efficiently connected by bolts or otherwise to the satisfaction of the Surveyors.

6. Where hollow pillars are to be used, the diameter and thickness of the same are to be submitted for the approval of the Committee.

7. If pillars be fitted on a shaft tunnel, the tunnel should be strengthened in way of them, by doubling plates, angle irons, and a transverse vertical plate, or by other efficient means to the satisfaction of the Surveyors. Great care is to be taken to insure the beams in the engine room being pillared where practicable.

## STRINGERS ON BEAMS.

**Section 16.** 1. All vessels to have stringer plates upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one, two, and three-decked vessels, and upon the main deck beams of spar and awning-decked vessels, to be of the breadth and thickness given for main stringer plates in Table G 4, for half the vessel's length amidships; from thence to the ends of the vessel they may be gradually reduced to the dimensions given for the ends of main stringer plates in Table G 4.

2. The stringer plates on ends of the beams next below the upper deck in two-decked vessels, and below the middle deck in three-decked vessels, and below the main deck in spar or awning-decked vessels, to be of the total breadth and thickness given for hold beam stringers in Table G 4.

3. The stringer plates on ends of middle deck beams of three-decked vessels, to be of the same width as that given in Table G 4, but they may be one-sixteenth of an inch less in thickness.

4. The stringer plates on the ends of spar-deck beams are to be the breadth of, and may be two-sixteenths of an inch less in thickness than, the stringer plates given on the upper line of Table G 4 for vessels of the same plating number, and may be reduced at their ends to seven-sixteenths of an inch, and to the breadth given for the ends of main deck stringer plates in Table G 4.

5. The stringer plates on the ends of awning-deck beams to be of the same width as given in Table G 4 for hold beam stringer plates, and to be six-sixteenths of an inch in thickness when the plating number is under 14,000, and seven-sixteenths of an inch in thickness when the plating number is 14,000 and under 26,000, and eight-sixteenths when the plating number is 26,000 and above.

6. The stringer plates on all tiers of beams are to be fitted home, and riveted to, the outside plating, all fore and aft, with angle irons of the dimensions required by Table G 2; the middle, lower, and orlop deck stringer plates to have an additional angle iron extending all fore and aft, riveted to the reversed frames, and to the stringer plates.

7. In cases where no deck is laid, and the width of the stringer plate on the ends of the hold beams

is objected to, it may be reduced, provided such reduction be fully compensated for, and receive the sanction of the Committee.

8. The objectionable practice of cutting through the stringer plates for the admission of wood roughtree stanchions will not be allowed. When the frames are extended through the upper deck stringer plate to form roughtree stanchions or bridge-houses, or poops and forecastles, there must be a continuous angle iron, of the size given for upper deck stringer angle irons, wrought on the upper deck stringer plate inside the frames.

9. The main and hold beam stringer plates may be reduced at the ends of the vessel to the sizes given for the same in Table G 4. Where a reduction of two-sixteenths of an inch in thickness is allowed, the stringer plate may be reduced one-sixteenth of an inch in thickness for one-eighth of the vessel's length before and abaft the half-length amidships, and from thence to the ends they may be reduced another sixteenth of an inch in thickness.

10. A lining piece should be fitted behind the upper deck stringer angle iron in one, two, three-decked, and spar-decked vessels, from butt-strap to butt-strap of the sheerstrake when single, to admit of those butt-straps being in one length, the lining piece being the thickness of the butt-straps, and increased in depth in way of scuppers to admit of being riveted to the sheerstrake above and below the upper deck stringer plate—unless the sheerstrake extend sufficiently high above the stringer plate to admit of a butt-strap being fitted above the stringer in the throat of the angle iron, and extending high enough to take two rows of rivets vertically above the angle iron. When the sheerstrake is doubled above the stringer plate, it should be extended sufficiently high above the latter to take two rows of rivets vertically in the butts above the upper flange of the gunwale angle iron.

11. The upper deck stringer angle iron is in all cases to be fitted on the upper side of the stringer plate, with its deep flange vertical and turned upwards.

12. When gutter waterways are fitted to upper decks in vessels having poops or forecastles, the angle irons forming the ends of the gutters are to be welded, and the gutters to be carefully caulked; and it is recommended that, when completed, they be cemented.

## TIE-PLATES ON BEAMS.

**Section 17.** 1. All vessels to have tie-plates ranging all fore and aft upon each side of the hatchways, *on each tier of beams*, these plates to be lapped or butted, and at least double riveted. Upon hold beams where no deck is to be laid, or where tie-plates would interfere with stowage of cargo, double angle irons of the dimensions given in Table G 2 for angle irons on lower deck beam stringer plates, placed at middle line or at each side of the hatchways, extending fore and aft wherever practicable, and well riveted to all beams, deck hooks, and transoms, will be admitted in lieu thereof.

2. Diagonal tie-plates are to be fitted on the beams of all sailing vessels in way of the masts at the deck on which they are wedged, and in addition, where the plating number is 15,000 and above, diagonal tie-plates are to be fitted all fore and aft on the upper deck.

3. Where diagonal tie-plates cross each other, or the fore and aft tie-plates, between the beams, and a deck is to be laid thereon, one set of tie-plates must be set down in way of the crossing, so as to leave one thickness only projecting above the beams.

4. The tie-plates to be of the width and thickness given in Table G 4, for half the vessel's length

amidships, tapered at the ends to the same thickness as the ends of the stringer plates. They are to be well riveted to each other, and to the beams, deck hooks, and transoms; and all butts to be properly shifted.

## HOOKS AND CRUTCHES, AND PANTING ARRANGEMENTS.

**Section 18.** 1. All stringers, where practicable, to extend fore and aft, and to be efficiently connected at their ends with plates forming hooks and crutches of the same thickness as the floor plates amidships, and those below the hold beams should be spaced about four feet apart. In vessels whose plating number is 24,000, or above, an additional hook or crutch should be fitted at the ends of the vessel, between each tier of beams, to the satisfaction of the Surveyors.

2. All vessels must have provision made to prevent panting, by extra beams, bracket knees, and stringer plates being fitted in the peaks, forward in sailing vessels and paddle steamers, and forward and aft in screw-propelled vessels and all vessels having a raised quarter-deck; the sizes, arrangement, and security of them to be to the satisfaction of the Surveyors.

3. In vessels having fine ends, these stringer plates are to be attached to the outside plating with an angle iron; and beams and stringer plates are to be fitted before the collision bulkhead, and also abaft, where necessary.

## PLATING.*

**Section 19.** 1. The thickness of plating for half the vessel's length amidships, to be as given in Table G 1, and may be tapered towards the ends of the vessel as described below; but in sailing vessels where the plating number is 16,000 or above, three strakes of plating at the bilges are to be increased one-sixteenth of an inch in thickness throughout, and when the plating number is 22,000 and above, the strake of plating in way of the hold beams is to be increased one-sixteenth of an inch in thickness, for one-half the vessel's length amidships.

2. No plates to be less in length than five spaces of frames, except the fore and after hoods.

3. No butts of outside plating in adjoining strakes to be nearer each other than two spaces of frames, and the butts of the alternate strakes not to be under each other, but shifted not less than one frame space.

4. The butts of the upper or main deck, and of spar-deck stringer plates, in all cases, to be shifted not less than two spaces of frames clear of the butts of the sheerstrakes.

5. The butts of the garboard strakes to be shifted clear of the keel scarphs, and not to be nearer each other on opposite sides of the vessel than two spaces of frames.

6. All butts of plating, where practicable, to be planed and fitted close; the edges of the plating to be sheared from their faying surfaces, or the burr caused by shearing to be carefully chipped off, and all outside edges of plating are to be either planed or chipped fair. The butts and edges to be carefully caulked.

7. The thickness of the sheerstrakes amidships to be as given in Table G 1, and their breadth to be not less than 30 inches where the number for plating is under 7,200; not less than 33 inches where the number is 7,200 and under 11,800; not less than 36 inches where the number is 11,800 and under

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have butt-straps double riveted, and, in addition, these double plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges; all butts of inside strakes to be riveted complete, independent of the outside strakes.

16,600 ; and not less than 40 inches where the number is 16,600 and above; except where the thickness is greater than prescribed, in which case the breadth may be diminished, provided the sectional area be not less than required by the Rules.

8. The sheerstrakes in one, two, three-decked, and spar-decked vessels, where the butt-straps do not extend to the upper edge in one length, to be fitted sufficiently high above the upper deck beam ends, so as to take two rows of rivets vertically in the butts above the upper flange of the gunwale angle iron.

9. The garboard strakes to be of the breadth and thickness amidships given in Table G 1.

10. The garboard strakes of screw-propelled vessels, if ten-sixteenths of an inch or more in thickness amidships, may be reduced one-sixteenth of an inch before and abaft the half length of the vessel; if nine-sixteenths of an inch and not less than seven-sixteenths, they may be reduced one-sixteenth of an inch *before* the half length only.

11. The garboard strakes of sailing vessels or paddle steamers, if seven-sixteenths of an inch or more in thickness, may be reduced one-sixteenth of an inch before and abaft the half length of the vessel.

12. The outside plating, if not less than six-sixteenths of an inch in thickness amidships, may be reduced one-sixteenth of an inch for a fourth of the vessel's length at each end. But the garboard strakes and boss plates in all screw steamers, and also the after hoods of plating connected to the stern frame, where the plating number is 16,600 and above, must be retained of the thickness required for the same strakes amidships.

13. When the plates are ten and under twelve-sixteenths of an inch in thickness amidships a reduction will be allowed of one-sixteenth of an inch for an eighth of the vessel's length before and abaft the half length amidships, and the remaining plates at the ends may be two-sixteenths of an inch less in thickness than those of their respective strakes amidships. When the plates are twelve-sixteenths of an inch or more in thickness amidships, they may be reduced three-sixteenths at the extreme ends of the vessel.*

14. The boss-plates covering the screw shaft are to be the same thickness as the strakes amidships of which they form part, where the number for plating is under 14,300 ; if that number and under 18,700, the plates are to be one-sixteenth of an inch thicker; and if the number is 18,700 and under 26,400 the plates are to be one-sixteenth of an inch thicker than the midship plating, and the butts treble riveted; and, where the number is 26,400 and above, the boss-plates and the plates above and below the same to be two-sixteenths of an inch thicker than the midship plating, and their butt-straps extended from frame to frame; or the boss-plates are to be doubled.

15. When plates forming the outside strakes of plating are above 40 inches but not exceeding 46 inches, or those forming the inside strakes are 48 inches in breadth and not exceeding 54 inches, their butts are to be treble riveted with straps $\frac{1}{16}$ of an inch thicker than the plates they connect. Where the butt-straps of such strakes are required by Section 20 to be treble riveted, the straps should be $\frac{2}{16}$ of an inch thicker. When for special reasons broader plates than above described are required, the sanction of the Committee for their use must be obtained.

16. Where gutter waterways are adopted at the upper deck, the butt-straps of the bulwark plating

* In sailing vessels the outside or overlapping strakes of plating for one quarter of the vessel's lengt at h r fore end should only be reduced one-sixteenth of an inch from the midship thickness.

are to be sufficiently broad to receive the spur in the middle of the bulwark stay; and when the plates do not exceed twelve feet in length they are to have stays fitted against the butt-straps, and an intermediate stay is to be fitted between the butts. In no case are the stays which support the bulwarks to be more than six feet apart. Their size may be from $1\frac{3}{8}$ in. to 2 in. in diameter, regulated by the length of the stay and the size of the vessel. These arrangements may be modified according to circumstances, if to the satisfaction of the Surveyors.

## BUTT-STRAPS.*

**Section 20.** 1. In vessels where the plating number does not exceed 8,000, the butt-straps of the sheerstrake, deck stringer plates, and one strake at the bilges for half the vessel's length amidships, are to be one-sixteenth of an inch thicker than the plates they connect, and be double riveted. When the plating number is above 8,000, and not exceeding 13,000, the butt straps of the deck stringer plates, sheerstrake, and two strakes of plating round the bilges are to be one-sixteenth of an inch thicker than the plates they connect for half the vessel's length amidships and treble riveted.

2. When the plating number is above 13,000, and not exceeding 17,000, the butt-straps of deck stringer plates, sheerstrake, and three strakes of plating round the bilges are to be one-sixteenth of an inch thicker than the plates they connect for half the vessel's length amidships and treble riveted.

3. When the plating number is above 17,000, and not exceeding 24,000, the butt-straps are to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted for four strakes of plating around the bilges, instead of three, as above, for half the vessel's length amidships.

4. When the plating number is above 24,000, and not exceeding 28,000, in addition to the above the butt straps of the remaining outer alternate strakes of plating are to be one-sixteenth thicker than the plates they connect and treble riveted for half the vessel's length amidships.

5. Where the plating number is above 28,000, and not exceeding 33,000, the whole of the butt-straps are to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted for half the vessel's length amidships.

6. Where the plating number is above 33,000, and not exceeding 40,000, the whole of the butt straps of the outside plating, and the upper and middle deck stringer plates, are to be two-sixteenths of an inch thicker than the plates they connect, and treble riveted for two-thirds the vessel's length amidships.

7. A lining piece should be fitted behind the upper deck stringer angle iron in one, two, three-decked, and spar-decked vessels, from butt-strap to butt-strap of the sheerstrake when single, to admit of those butt-straps being in one length, the lining piece being the thickness of the butt-straps, and increased in depth in way of scuppers to admit of being riveted to the sheerstrake above and below the upper deck stringer plate,—unless the sheerstrake extend sufficiently high above the stringer plate to admit of a butt-strap being fitted above the stringer in the throat of the angle iron, and extending high enough to take two rows of rivets vertically above the angle iron. When the sheerstrake is doubled above the stringer plate, it should be extended sufficiently high above the latter to take two rows of rivets vertically in the butts above the upper flange of the gunwale angle iron.

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have butt-straps double riveted, and, in addition, these doubling plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges; all butts of inside strakes to be riveted complete, independent of the outside strakes.

8. All butt-straps to be of the breadth given in Table G 1, and in no case to be less in thickness than the plates they connect; the fibre of the iron to be in the direction of the fibre of the plates they connect.

### LINING PIECES.

9. The space between the plating and the frames to have solid filling or lining pieces in one length, closely fitted; to be of the same breadth as the frames, excepting in way of bulkheads, where they are to be fitted as stated in Section 22, Paragraph 5.

### RIVETING AND RIVETS.* (See also Table G 5.)

**Section 21.** 1. The landing edges of outside plating when seven-sixteenths of an inch in thickness and above from the keel to the upper turn of bilge, *and of the sheerstrake;* and when nine-sixteenths of an inch and above from the upper turn of bilge to the gunwale, must be double riveted; below these thicknesses the edges may be single riveted. In all cases the thicker of the two plates is to regulate the size of the rivets, and the requirements as to double riveting. When the plating is of a thickness amidships to require the edges to be double riveted, the same is to be continued all fore and aft. The stem, stern-post, keel, butts of outside plating, breasthooks, transoms, stringer and tie-plates on beams, also butts of keelsons, stringers, and all longitudinal ties, to be at least double riveted in all vessels.

2. The butts of outside plating to be chain riveted. All double and treble riveting, except in the keel, stem, and sternpost, is recommended to be chain riveting.

3. In chain-riveted butts, a space equal to twice the diameter of the rivet to be between each row; where treble riveting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row.

4. The overlaps of plating, where chain riveting is adopted, are not to be less than six times the diameter of the rivets; and, where single riveting is admitted, to be not less than three and a half times the diameter of the rivets.

5. The butts of side plating of *short* poops, topgallant forecastles and bulwarks, may be single riveted.

6. The rivets are not to be nearer to the butts or edges of the plating, butt-straps, or of any angle iron, than a space equal to their own diameter; and, in edge riveting, the space between any two consecutive rows of rivets must not be less than once and a half their diameter.

7. The rivet holes to be regularly and equally spaced and carefully punched from the faying surfaces opposite each other in the adjoining parts, laps, lining pieces, butt-straps, and frames; and countersinking to extend through the whole thickness of the plate or angle bar. *They are to be spaced not more than four diameters of the rivet apart from centre to centre in the butts of the plating, and not more than from four to four and a half diameters apart in the edges of the plating and at other parts,* excepting in the keel, stem, and sternpost, where they may be five diameters, and through the frames and outside plating

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have butt-straps double riveted, and, in addition, these doubling plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges; all butts of inside strakes to be riveted complete, independent of the outside strakes.

and in reversed angle irons on frames, where they may be eight diameters apart from centre to centre The rivets in the flanges of the gunwale angle irons to be spaced not more than four and a half diameters apart from centre to centre ; and those connecting iron decks and stringer plates to the beams to be spaced from seven to eight diameters apart.

8. For arrangement of rivets showing minimum number in each frame space in the edges of plating amidships, *see* Table G 5.

9. There are not to be less than four rivets in each flange of the angle irons between the frames which connect the stringer plates and intercostal plates to the outside plating, where the spacing of the frames from centre to centre is twenty-three inches and above ; but, where the frames are closer spaced, there are not to be less than three rivets.

10. The rivets are to be of the best quality, and to be in diameter as per Table G 5, and to be increased in size under their heads to fill the rivet holes. When riveted up, the rivets are completely to fill the holes, their heads are to be "laid up," and their points or outer ends are not to be below the surface of the plating. Rudder rivets should be of not less size than required for the upper edge of the garboard-strake amidships, and spaced not more than five diameters from centre to centre. They should have full snap heads and points, or should be otherwise completed to the satisfaction of the Surveyor.

## BULKHEADS.

**Section 22.** 1. Screw-propelled vessels, in addition to the engine-room bulkheads, to have a water-tight bulkhead built at a reasonable distance from each end of the vessel. In steamers 280 feet long and above, an additional bulkhead is to be fitted in the main hold about midway between the collision and engine room bulkheads, *and extending to the upper deck in vessels with one, two, or three decks, and to the spar deck in spar-decked vessels, and to the main deck in awning-decked vessels ;* and in steamers of 330 feet long and above, an additional bulkhead is to be fitted in the after hold extending to the same height.

2. The foremost or collision bulkhead in all cases to extend from the floor-plates to the upper, spar, or awning deck, and its water-tightness is to be tested by hose or other means, and to be in position to the satisfaction of the Surveyors.

3. When a bulkhead is not completed at one pair of frames from the floor-plate up to its prescribed height per rule, but is recessed, stepped, or stopped at an intermediate part, the water-tightness is to be completed with iron collars or chocks forming an "iron to iron" connection, to the exclusion of cement, wood, &c.

4. The engine-room bulkheads to extend from the floor-plates to the upper deck, in vessels with one, two, or three decks ; and to the spar deck in spar-decked vessels, and main deck in awning-decked vessels. The aftermost bulkhead will be required to extend to the height of the upper or spar deck, unless a different arrangement of bulkheads be approved by the Committee. This bulkhead is to be made water-tight by a stuffing box where the screw shaft passes through, and its water-tightness is to be tested by the after compartment being filled with water.

5. In sailing vessels the foremost or collision bulkhead only will be required.

6. All plating of bulkheads to be of the thickness prescribed in Table G 1 ; and to be fitted between two frames at each side of the vessel, and to be strongly riveted to them. Lining pieces between frames

and outside plating in way of bulkheads, are to extend in one piece from the foreside of the frame afore to the aftside of the frame abaft the bulkhead frames.

7. The bulkheads to be supported vertically on one side, and horizontally on the other, with angle irons of not less size than required for the *main* frames. The vertical angles to be not more than two feet six inches apart, and their lower ends are to be well riveted to the floor-plates, or to the inner bottom plating, where a double bottom is fitted; and on the opposite side of the bulkheads the horizontal angles should not exceed four feet apart below where they are supported by a laid deck. In vessels of forty feet breadth and above, the engine room bulkheads should be additionally strengthened by a vertical web at the middle line, extending from the keelson to the hold beams, or by other means, to the satisfaction of the Committee. All such bulkheads to be caulked and made thoroughly water-tight.

8. The upper half depth of bulkhead plating may be one-sixteenth of an inch less in thickness than the lower half when the latter is six-sixteenths of an inch or above in thickness.

## WOOD DECKS.

**Section 23.** 1. The flat of decks, if of wood, to be of good quality, properly seasoned, free from sap and objectionable knots; the thickness and fastenings as per Table G 2.

2. In all cases the margin or boundary planks of weather decks in vessels intended for the 90A class or above, to be either Teak or Greenheart.

3. If the deck is of teak, it may be *one-sixth* less in thickness than prescribed in Table G 2.

4. When the deck planks are six inches in width and under, single fastening will be sufficient; but when they are above six inches, and not exceeding eight inches in width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding eight inches in width must be double fastened with nut and screw bolts.

5. The upper deck to be fastened by screw bolts, with nuts at the under side of the angle iron of the beams, and tie-plates. The bolts must be properly sunk, *with oakum and white lead under their heads*, and be carefully covered over with turned dowels, bedded in white lead, marine glue, or other suitable composition. It is recommended that the screw bolts be galvanized. For size of bolts, see Table G 2.

6. Where diagonal plates are fitted on the beams of iron vessels, the deck planks should be scored over the diagonal plates, so as to fit close on the beams, thereby avoiding the use of wood pads.

7. Upper decks must be renewed when worn in thickness as follows, viz. :—When a deck originally required to be 4 inches thick is worn to 3 inches; $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches; 3 inches to $2\frac{1}{2}$ inches.

## IRON DECKS. (See also Table G 4.)

8. Where iron decks are fitted of six-sixteenths of an inch in thickness and under, and no wood deck is laid on the same, beams of angle iron, or angle bulbs, of the sizes given in Table G 3, are to be fitted to every frame, except at the ends of the hatchways, where they are to be of bulb iron, of the size required by the Rules for vessels of the same breadth having no iron deck. Where these angle irons or angle bulbs are fitted to every frame, a stringer is to be fitted at the middle line of the vessel to the under side of the iron deck, formed of a bulb plate scored over the vertical flange of the beams, and connected to the deck by angle irons. Or, any other approved web may be fitted if extending sufficiently below the beams to admit of the pillars being riveted to the same.

9. Where iron decks exceed the above thickness, bulb iron beams may be fitted to alternate frames in the usual manner, *but angle iron or angle bulb beams to every frame, except at the ends of hatchways, are considered preferable.* Where no wooden deck is to be laid on an iron deck, angle iron half beams, of the size given in Table G 3, are to be fitted to every frame in the way of all hatchways.

10. When the deck plating is seven-sixteenths of an inch in thickness amidships, it may be reduced one-sixteenth of an inch before and abaft the half length amidships; when eight-sixteenths thick amidships, it may be reduced to seven-sixteenths for an eighth of the length before and abaft the half length, and the remainder to six-sixteenths of an inch.

11. If a wood flat be laid over an iron upper deck, it may be half an inch less in thickness than prescribed by Table; and in such cases the iron deck, if six-sixteenths of an inch in thickness, may be reduced one-sixteenth of an inch before and abaft the half length; if seven-sixteenths in thickness amidships, it may be reduced to six-sixteenths for an eighth of the length before and abaft the half length, and the remainder to five-sixteenths of an inch. *The wooden flat should in addition be efficiently secured between the beams to the iron deck.*

12. The butts of the iron deck to be double riveted for half the length amidships; and, where large openings are cut in iron decks, compensation is to be given for the same.

13. If a wood flat be laid over an iron middle deck, it may be $2\frac{1}{2}$ inches in thickness.

14. Where a vessel has an iron deck for half her length amidships, or beyond, but not a complete iron deck, or where there are one, two, or three iron decks; or one, two, or three iron decks, and in addition, a partial iron deck, as before described, the same will be inserted in the Register Book thus—pt Iron dk; 1 Iron dk; 1 Iron & pt Iron dk; 2 Iron dks; &c., &c., as the case may be.

## DOUBLE BOTTOMS.

**Section 24.** 1. Vessels fitted with a double bottom for the purpose of water-ballast extending throughout the whole or part of the length of the vessel, will have the same denoted in the Register Book, together with its length and capacity. (*See* Key to Register Book.)

2. Side intercostal plates or side keelsons need not be fitted in the range of double bottoms; but, where partial double bottoms are fitted, these keelsons are to extend into or scarph the double bottom not less than three spaces of frames, and be connected to the longitudinal girders where practicable.

3. "Manholes," with wrought-iron covers, must be constructed, or provision made for the removal of a portion of the plates so as to enable the inner surface of outside plating, the frames, floors, keelsons, and rivets to be thoroughly examined and coated when required, and in way of the manholes in the inner bottom plating, doubling plates or rims should be fitted to receive the fastening of the covers. The double bottom to be made water-tight, and all water-tight joints to be tested on completion with a head of water at least equal to the extreme draught of water of the vessel.

4. All water-tight joints to have the surfaces of iron fitted close to each other and caulked, without, as far as practicable, the use of felt, canvas, &c.

5. The upper side of the plating must be protected with wood planking as ceiling, in no case to be less than $2\frac{1}{2}$ inches in thickness, the same to be laid on battens, to admit of drainage water passing to the well.

6. Where a double bottom extends through the engine and boiler space, a *well* should be formed between the engine-room after bulkhead and the floor immediately before the same, for the drainage of water, or *open* gutter ways of sufficient size should be made in the wings, so as to be always accessible.

7. All loose ceiling on double bottoms to be removed, when the tanks are required by the Rules to be tested.

8. It is of importance that ample provision should be made for the free passage of air from one division to another, so that it may readily find its way to the air pipes. This should be done by fitting the liners short, setting down the angle iron from the inner bottom or top of deep tank wherever necessary, and leaving, otherwise, a sufficient number of holes as near to the inner bottom as practicable. The air pipes should also be sufficient in number and size; and, wherever necessary, one should be fitted at each end of each tank on both sides of the vessel.

9. No class will be assigned to vessels having a double bottom, or part double bottom, unless such double bottom, or part double bottom, be constructed in accordance with the requirements of the Rules, or of strength equal to that prescribed thereby.

10. For record of double bottoms, &c., in the Register Book, *see* the Key to the Register in the Appendix to the Rules.

## DOUBLE BOTTOMS FORMED WITH GIRDERS ON TOP OF ORDINARY FLOORS.

11. Where double bottoms are fitted with longitudinal girders extending on top of ordinary floors, the inner or second bottom must be efficiently constructed and made water-tight; the plating of it not to be less than five-sixteenths of an inch in thickness, where the vessel's number is under 11,000; if of that number or above, it is to be six-sixteenths of an inch in thickness, and the flange or side plate in each instance must be one-sixteenth of an inch thicker. The double bottom to be efficiently connected to the outside plating and frames of the main body of the vessel; and when reversed frames are cut, they must be compensated for by doubling the frames with short angle irons of their own size. The butts of the flange-plate to be double riveted; the butts and edges of the remaining plates may be single riveted.

12. Where double bottoms are fitted in the fore and after holds, and not extended through the engine-room, great care should be taken to provide against an abrupt termination in the longitudinal girders; they are either to be carried through the engine-room, or fully compensated for, by connection with the longitudinal engine and boiler bearers, or otherwise, to the satisfaction of the Surveyor. *The longitudinal girders should be connected to double reversed angle irons on the floors.*

13. Where double bottoms, or part double bottoms, are fitted with longitudinal girders on the floors, all the outside plating (except the garboard strakes) which is entirely within the boundary of them may be one-sixteenth of an inch less in thickness than that prescribed in Table G 1, provided that thickness be ten-sixteenths of an inch or more.

## CELLULAR DOUBLE BOTTOMS.

14. The scantlings of the various parts of the double bottom are to be as given in Table G 6, and the spacing of the longitudinal girders should be from 42 inches to 54 inches, according to the size of the vessel.

15. In vessels whose plating number is 17,000 and under, triangular bracket plates of the thickness given in Table G 6 may be fitted at alternate frames; but under the engines, solid floor plates of the same thickness, lightened by manholes, and with double angle irons on the upper edge, are to be fitted at every frame, and at alternate frames under the boilers. Where the plating number exceeds 17,000, instead of bracket plates, solid floor plates lightened by manholes are to be fitted throughout the whole length of the double bottom. In all vessels where flat plate keels are adopted, and in vessels having hanging keels whose plating number is 22,000 and above, bracket plates are to be fitted to the centre girder at the intermediate frames, and in all vessels, bracket plates inside and outside the double bottom are to be fitted to the margin plate to every frame all fore and aft.

16. Intermediate angle irons are to be fitted for stiffening the inner bottom plating, unless the longitudinal girders are more closely spaced than given above and solid floors are fitted to alternate frames, when they may be dispensed with, if approved by the Committee.

17. Hanging keels, when adopted with this system of construction, are to be formed of side plates on each side of the centre girder, which is to extend down to the lower edge of keel.

18. The inner bottom plating to be continuous and wrought longitudinally. The butts to be shifted well clear of each other and of the butts of the longitudinal girders, and the edges to be shifted well clear of the latter.

19. The butts and edges of the middle line strake, all fore and aft, and also the butts of the inner bottom plating in the engine and boiler space, are in all cases to be double riveted. Where the plating number is 20,000 and under 30,000 the butts of the inner bottom plating are to be double riveted for half the vessel's length amidships. Where the plating number is 30,000 and under 38,000, the butts of the inner bottom plating, and the edges of an additional strake on each side of the middle line, are to be double riveted throughout.

20. The buts of the side girders and margin plate are to be double riveted; and in vessels whose plating number is under 21,000, the butts of the centre girder are to be connected by double butt straps, double riveted. When the plating number exceeds 21,000, the butts are to be treble riveted, with the alternate rivets in the back row omitted. The double butt straps, in all cases, to be each not less than two-sixteenths of an inch thicker than half the thickness of the plates they connect.

21. The rivets in the butts and edges of the inner bottom plating and girders are to be spaced not more than four diameters apart.

22. Manholes are not to be cut in the centre girder, and the manholes in the side girders are to be shifted well clear of each other transversely, and of the manholes in the inner bottom plating, and also clear of all butts. The manholes in the floor plates, side girders, and inner bottom plating, are to be no larger and not more numerous than necessary to render all parts of the double bottom readily accessible. The edges of the manholes should be fairly smooth to enable them to be entered with facility.

23. The bulkheads are to be connected to the inner bottom plating by double angle irons, of the size required for the reversed frames, and to be caulked and made watertight.

24. In this system of construction, no reduction of thickness in the plating from the requirements of Table G 1 will be allowed where the floors are not spaced to every frame.

## CELLULAR DOUBLE BOTTOMS HAVING CONTINUOUS FLOORS FROM CENTRE GIRDER TO MARGIN PLATES.

25. When double bottoms are constructed with solid floor plates lightened with manholes fitted to every frame, and continuous in one length from the middle line to the margin plate, the scantlings are to be as given in Table G 6, and intercostal plates are to be fitted about midway between the centre girder and margin plate, and well connected to the floors and to the inner and outer bottom plating.

26. In this system of construction the outside plating (except the garboard strakes and flat keel plates), which is entirely within the boundary of the double bottom, may be reduced as hitherto admitted in double bottoms with ordinary floors.

27. Any other plan of fitting double bottoms may be adopted, provided in the first instance it receives the approval of the Committee.

## CEILING.

**Section 25.** 1. All vessels to be closely ceiled from the main keelson to the upper part of the bilges, the ceiling to be secured in such a manner as to be easily removed. From the upper part of the bilges upwards, either batten and space or close ceiling may be adopted, but the former is considered preferable.

2. The ceiling on the floors is to be made in hatches where practicable, of convenient sizes, and, when not so arranged, to be fastened to the reversed angle irons or frames in such a manner as to be removed when required for the purpose of survey, or for cleaning and painting.

3. For thickness of ceiling, *see* Table G 2.

4. Vessels engaged *exclusively* in the coal trade will not be required to have cargo battens fitted.

## ENGINE SPACE.

**Section 26.** 1. In vessels propelled by machinery, care must be taken that the engine and boiler bearers are properly constructed, having efficient longitudinal ties; and, where the bearers may interfere with the longitudinal strength of the vessel, they must extend a sufficient distance beyond the bulkheads of the engine and boiler space, to compensate for such interruption.

2. Where it is intended to fit engines of greater power than is done in ordinary cargo carrying steamers, the engine seating should be of proportionately greater strength, and be specially adapted with this object in view by being connected to the sides of the vessel; and other means adopted to ensure greater rigidity and strength to withstand the extra vibration produced in this part of the vessel. The after floor-plates should also be extended well above the screw-shaft, and the after lengths of outside plating attached to the stern-frame should be of not less thickness than the plates in the same range amidships. More than usual care should be bestowed in ensuring sound riveting and workmanship at this part; and it is recommended that the after frames be sufficiently apart transversely to admit of this being effected.

3. When the machinery and boilers are fitted, as many *upper*, *middle*, and hold or lower-deck beams of extra strength, having double angle irons at upper and lower edges of the sizes, as per Table G 3, are to be introduced as may be practicable; and the vessel to be otherwise made secure where necessary in the engine-room, to the satisfaction of the Surveyors. *See* page 33, paragraph 5.

4. In the engine and boiler space, double reverse angle irons must be fitted to every floor, from bilge

to bilge; and in vessels where the number for plating is 15,000 and above, or the depth from the hold beams is 15ft. or above, they are to extend sufficiently high to admit of the bilge stringer angle irons being riveted to them, unless the bilges are otherwise additionally strengthened by web-frames. Where the number is 16,000 and under 18,000, not less than three web-frames are to be fitted on each side, formed of plates of not less than the thickness of the frames, and sufficiently broad to receive double angle irons on their inner edge, passing within the bilge stringer angle irons and to scarph the ends of the floors, and extend to the deck next above the hold beam stringer plate. Where the number is 18,000 and under 30,000, these web-frames are not to be more than from 8 to 10 feet apart, and where the number is 30,000 and above, they are not to exceed 8 feet apart. And the whole of the reverse frames in way of the engine and boiler space, in vessels where the plating number is 18,000 and above, are to extend to the upper deck, or the web-frames should be extended to this height. The web-frames are to be fitted in way of the deck beams when practicable, and if fitted between the beams they are to be connected to the stringer plate by bracket knees above and below the same.

5. Where it is desired to adopt other plans than the foregoing for maintaining the necessary rigidity in the engine and boiler space, sketches of the same must be submitted for the approval of the Committee.

### SHAFT TUNNEL.

6. The plating of shaft tunnels to be from $\frac{4}{16}$ to $\frac{6}{16}$ of an inch in thickness, in proportion to the size of the vessel: the top plating in way of the hatchways to be not less than $\frac{2}{16}$ of an inch thicker than the remaining plates, or to be covered with wood not less than two inches thick. The tunnel to be additionally strengthened with transverse angle irons not more than four feet apart, of the size of the reversed frames, and the plating to be caulked, and the tunnel to be made water-tight. The recess bulkhead and top plating to be strengthened and supported by similar angle irons, but spaced the same as the vessel's frames; the top plating where attached to the sides of the vessel to be made watertight with *iron* collars or chocks to the exclusion of wood or cement. The tunnel to be fitted with a water-tight sluice door on the engine room bulkhead, capable of being closed from the upper deck.

### COCKS, VALVES, AND SOIL PIPES.

**Section 27.** 1. A sluice cock or valve is to be fitted at the limbers, at each water-tight bulkhead, to allow water to be shut off, or to reach the pumps when required; the same to be fitted, so as to be controlled above the load water-line, and to be boxed in, to prevent injury.

2. The shut-off valves or cocks of all openings for the inlet or outlet of water, in connection with the engines and boilers, are to be fitted close to the vessel's sides, and are to be accessible at all times.

3. All head and stern pumps to be efficiently provided with stop-cocks, to the satisfaction of the Surveyors.

4. Where soil pipes are attached to the outside plating below the load water line, the lower length must be of iron of substantial thickness, and be secured to the plating with a proper faced-joint, and extended for some distance above the load water-line.

5. If the remainder of the pipe be of lead, care must be taken that it be of substantial thickness, and that it be properly protected externally with either zinc or iron, to the satisfaction of the Society's Surveyors.

## HATCHWAYS AND MAST PARTNERS.

**Section 28.** 1. All hatchways are to be properly framed to receive half-beams where required, and the mast-holes to have partners at the upper deck and at the tier of beams where the masts are wedged, the plating of which is not to be less in thickness than is required for stringer plates, and the united breadths of the plates are not to be less than twice the diameter of the masts. These plates are to be well riveted to each other, and to the beams; and at the decks, where the masts are to be wedged, an angle iron of the dimensions required for the main frame of the ship is to be properly fitted and riveted to the plate round the mast-holes.

2. It is recommended to have only one large angle iron on the beams where comings are intended to be fitted of sufficient size to compensate for double angle irons, the angle iron to be on the side of the beam that will be clear of the hatchway space. Plates are to be fitted and riveted to these beams, where necessary, in order that the ends of the deck may be properly fastened.

3. Where upper deck hatchways are above twelve feet and not exceeding sixteen feet in length, strong shifting beams are to be fitted with proper means for firmly securing the same. Where the length is above sixteen feet and not exceeding twenty feet, a deep web-plate is to be fitted between double angle irons, at the middle of the length, extending the depth of the comings and carlings; and the fore and aft tie-plates in way of the same, and extending two spaces of beams beyond each end of the hatchway or opening, are to be double the width of that given in Table G 4, or such other arrangement as may be considered equal thereto may be adopted, if approved by the Committee. When the length exceeds twenty feet, a deck plan is to be submitted for the approval of the Committee, showing the necessary additional transverse strength proposed to be applied, by increasing the number of web-plates, and either increasing the width of the stringer and tie-plates, or by plating the beams in way of the same, as the case may require. Where iron decks are fitted, as required by the Rules, additional strength is to be applied around all hatchways of twenty feet and above, either by doubling the plating, or by fitting plates of the breadth and thickness required for tie-plates in Table G 4.

4. All hatchway comings on weather decks and the companions at the fore-end of steamers to be of iron.

5. In all cases where half-beams are required, fore and aft carlings of the same size and description as the hatchway beams, are to be fitted in the hatchway spaces; the plates forming the comings and head ledges are to be of sufficient strength in proportion to their size, and are to extend to the lower edge of the beams and carlings, and must be riveted to them, excepting that when the beams are of bulb iron they may then terminate on the bulb; where coming plates are of extra thickness the carlings may be dispensed with. *(See sketches after page* 80.)

6. Half beams are to be fitted to alternate frames between the hatchway beams, and their ends are to be secured by the angle irons on their upper edges being made knee-shaped, and fitted and riveted to the fore and aft carlings or comings. In addition, fore and aft tie-plates are to be fitted close to the comings and riveted to the beams and half beams. An angle iron with its flange of sufficient depth to extend half an inch above the deck, is to be fitted and riveted to the comings and head-ledge plates, and to the beams and tie-plates; its upper edge to be properly caulked, and the rivets used in its vertical flange to be countersunk and flush-headed.

7. In vessels having long hatchways for the purpose of "self trimming," wing boards are to be fitted to the approval of the Committee, to prevent the shifting of cargo.

8. The hatches of steamers to be solid, not less than $2\frac{1}{2}$ inches in thickness.

## ENGINE AND BOILER OPENINGS.

**Section 29.** 1. The engine and boiler openings of the weather deck of steam vessels are to be properly framed for a height of not less than eighteen inches above the deck, the coming plates to extend to the lower edge of the beams, and iron trunk bulkheads connected to the comings should be fitted to a height of about seven feet above the deck; the thickness of the same, where exposed, to be not less than that required for the side plating of poops, and to be efficiently stiffened by vertical angle irons of the size of the reversed frames thirty inches apart, connected to the coming plates. The thickness of the comings to be one-sixteenth of an inch more than required for the trunk bulkheads. Where the trunk bulkheads are enclosed by a complete bridge house extending to the sides of the vessel, and efficiently protected from the force of the sea, a reduction from the above thickness might be admitted, provided in such cases a plan showing the proposed arrangement be furnished for approval. (*See sketches after page* 80.)

2. The engine and boiler openings in the 'tween decks of all vessels are also to be enclosed by trunk bulkheads efficiently stiffened by angle irons and extending to the weather deck beams, to which they are to be secured.

3. Strong iron doors will be allowed in these trunk bulkheads, provided their lower parts are at least eighteen inches above the deck, and efficient arrangements made for their security.

4. When a poop, bridge house, or awning deck covers the engine and boiler space, the comings of the engine and boiler openings should not be less than two feet above such deck, unless these openings are constructed as provided for in the first paragraph of this section.

5. It is considered that in all cases the engine and boiler openings should be made as small as practicable, and be subdivided by athwartship iron divisional casings to secure the maximum safety of the vessel. The two sides of the casing should in all instances be efficiently connected by angle iron beams within them at the upper part.

6. The engine room skylights are to be in all cases substantially constructed and to be securely bolted or riveted to the comings, and where the skylight top is not solid with bull's eyes fitted in the same, efficient deadlights of iron or wood must be provided. The grating openings over the stokehold must also be protected by iron plates, fitted with hinges, or otherwise in manner satisfactory to the Surveyors.

7. Where either the engine or boiler opening on the upper deck exceeds twelve feet long, or the combined length exceeds twenty-four feet, plans for giving additional strength in way of the same are to be submitted for the consideration of the Committee.

8. Where either of the openings exceeds fifteen feet, or the combined length exceeds thirty feet, the beams in way of the same are to be plated over from the stringer to the tie-plates, the plating extending two beam spaces beyond the openings, and tapered from thence towards the stringer plate for a distance not less than the breadth of the plating required to be fitted; the thickness of this plating to be the same as given in Table G 4 for iron decks.

9. Where large openings are adjacent to each other, the space between should be plated over wherever practicable.

### COAL BUNKER PIPES AND LIDS.

**Section 30.** Coal bunker pipes, where practicable, are to be formed so as to be at least twelve inches above the upper deck, fitted with lids having studs to fit in openings made in the pipes, for their security; the pipes to be so formed that tarapuling may be securely lashed over them. Where there are coal bunker hatches in the weather deck they must be properly framed with iron comings of suitable height having solid hatches secured by an iron bar or other approved fastening.

### PORTS AND SCUPPERS.

**Section 31.** 1. All vessels must be fitted with a sufficient number of ports and scuppers, to readily discharge any large quantity of water from the upper deck. The ports and flaps, where such are adopted, are to be hung by strong hinges, and the scuppers formed in the vertical flange of the upper deck stringer angle iron, which is to be increased in depth, so as to enclose the scuppers; or any other equally efficient plan may be adopted.

2. Where the bulwark plating and roughtree rail are cut through to form a cargo port, the bulwark stays at each end of the port should be of increased strength, to the satisfaction of the Surveyors.

3. A sufficient number of scuppers, with proper pipes attached to them, are to be fitted in all 'tween decks to convey water or leakage to the bilges.

### VENTILATORS.

**Section 32.** 1. It is recommended that ventilators, sufficient in number and size, be efficiently fitted to the upper deck of all vessels.

2. When scuttles are fitted for ventilation in the topsides of vessels, strong covers for them are to be provided; these covers to be efficiently fitted, to the approval of the Surveyors.

3. Where scuttles are fitted in the sheerstrake within three-fifths of the vessel's length amidships, compensation is to be given either by an extra thickness in the sheerstrake, doubling plate in way of the scuttles, or else by the introduction of strong angle iron over them.

### CHAIN PLATES.

**Section 33.** The chain plates to be in proportion to the size of the vessel, and riveted efficiently to the outside plating (not bulwark plating), the sheerstrake being preferable.

### BITTS.

**Section 34.** All bitts, when not of iron, and which do not go down to the deck below, to be fitted into iron sockets fastened through the deck to plates riveted to the beams.

### CEMENT.

**Section 35.** The frames and plating of the bottom of all vessels to the upper part of the bilges to be thickly and efficiently covered with Portland or other approved cement, which may be mixed with sand or other suitable substance. Care to be taken to have a proper substance of cement at its termination, and to keep the watercourses clear all fore and aft. The whole to be to the satisfaction of the Surveyors.

### RUDDER.

**Section 36.** The rudder to be made to ship and unship while the vessel is afloat. The size of main piece, given in Table G 2, to be regulated by the number which regulates the thickness of the vessel's plating; it is to be of the best hammered iron. The frame of the rudder and main piece to be one forging; the frame to be properly stayed by wrought-iron stays welded on the frame, and to be carefully

plated and riveted. It is recommended that the pintles be made independent of the frame. They should be spaced not more than from 4 feet to 5 feet 6 inches, and the upper one should be placed as near as practicable to the rudder trunk, and the rudder plates should be secured to the frame with rivets of not less size than required for the upper edge of the garboard strake amidships, and spaced not more than five diameters from centre to centre. They should have full snap-heads and points, or should be otherwise completed to the satisfaction of the Surveyors. All vessels to have a spare tiller and gear ready for use if required. (*See* footnote to Table G 5).

## WINDLASS AND HAWSE-PIPES.

**Section 37.** 1. The windlass, *for all grades*, if of wood, may be composed of either of the following timbers; namely, English, African, or Live Oak; Adriatic, Italian, Spanish, Portuguese, or French Oak; East India Teak, Morung Saul, Greenheart, Morra, or Iron Bark. The iron spindle in all cases to pass through the body of the windlass.

2. The hawse-pipes must be of sufficient size and thickness, and the outside flange of proper form to admit of an easy lead for the cable to the windlass, or capstan.

## PUMPS.

**Section 38.** 1. In addition to the engine pumps in steam vessels, an efficient pump is to be fitted in the bilges, on each side of the vessel, to each cargo compartment, capable of being worked from the upper or main deck, or such other arrangement may be adopted as may, when submitted to the Committee for their approval, be deemed satisfactory by them. A doubling plate should be fitted under all sounding pipes.

2. *In the case of new steam vessels plans of the various compartments, showing the intended arrangement of the bilge suction pipes, sluices, and roses connecting the main and donkey engine pumps with these compartments, are to be submitted, in the first instance, for the approval of the Committee.*

## EQUIPMENT.

**Section 39.** 1. All vessels are required to have their masts, spars, and rigging in good order, and sails in sufficient number and in good condition.

2. Every ship is to be provided with anchors, cables, &c., of approved quality, properly tested at a *public machine*, in number and length, as set forth in the Table No. 22 annexed (or at page 119).

3. In cases, however, where anchors and chain cables are manufactured abroad and supplied to *foreign owned vessels*, and testing certificates are furnished setting forth that the anchors and chain cables have been tested at a Government machine, or a machine under the control of a municipal body, or a similar responsible body, such certificates will be accepted as complying with the requirements of the Rules for obtaining the figure 1, provided the remaining requirements of Table 22 be complied with, but in these cases the record of A.&C.P. will not be made in the Register Book.

4. A Certificate of all chains and anchors having been tested, and of the strain applied to them, must be produced before the ship is classed with the figure 1.

5. The equipment as regards anchors, chains, warps, &c., is to be regulated by the number produced by the sum of the measurements of the half moulded breadth of the vessel amidships, her depth from the upper part of keel to the top of the upper deck beams, and the girth of her half midship section to the same height, multiplied by her length, for a one, two, or three-decked vessel, and for a spar-decked vessel,

awning-decked vessel, or a vessel having a continuous shade deck, the measurements of depth and girth are to be taken to the top of the spar, awning, or shade deck beams, as the case may be.

6. For a steam vessel with a partial awning deck, poop, top-gallant forecastle, *enclosed* bridge-house, or a raised quarter-deck, the equipment number to be increased *one-fifteenth* beyond that which it would be if she were flush-decked, when the united lengths of such erections does not exceed one-fourth the length of the vessel, and when this proportion of the length is exceeded, the equipment number to be increased *one-tenth* beyond that which it would be if she were flush-decked.

7. All vessels under 150 tons to be provided with one good boat; and every vessel of 150 tons, and above, to have a suitable number. The Surveyors are to be particular in examining and reporting the condition of the boats of all vessels.

8. In ships navigated by steam, the boilers and machinery are to be considered as part of the equipment, and unless the Surveyors are satisfied of their efficiency, the figure 1 will be withheld, and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules.

9. The efficient state and condition of the whole of the ship's equipment will be designated by the figure 1; and where the same is found insufficient in quantity, or defective in quality, by a dash thus — following the character assigned to the ship.

## DEFECTIVE EQUIPMENT.

10. In the case of a steam vessel already classed of which the engines or boilers are reported to be so far inefficient or defective as to imperil the vessel's safety, an indication to that effect will be made in the Register Book by a red ring being stamped or posted over the figure 1 for equipment, and in the case of vessels about to be built, for which drawings are submitted for the approval of the Committee, and where the engines or boilers are of novel description, or where experience has not sufficiently shown the safety of the principle or mode of application involved, the figure 1 will not be assigned, and the words— "Boiler Experimental," or "Machinery Experimental," will be placed against the class of the vessel in the Register Book, but where in the opinion of the Committee the machinery or boilers are deemed so far inefficient or defective as to imperil the vessel's safety, the figure 1 will be withheld, and a red ring inserted in place thereof; and, in the case of masts or rigging of a ship which are reported to be so far defective as to imperil the vessel's safety, the indication in the Register Book will be made by a black ring, stamped or posted over the figure 1 for equipment; as described in the foot-note on the page of the Register Book and in the Key thereto.

## MACHINERY AND BOILERS OF STEAM SHIPS.

11. In new vessels propelled by steam, and in vessels fitted with new engines or boilers, the machinery is to be submitted to the inspection of the Society's Engineer-Surveyors, who will furnish a report to the Committe describing them, in the manner and form, No. 8 annexed. The Committee will thereupon, if found satisfactory, grant a certificate and insert in the Register Book the notification, "L.M.C." *in red* (*i.e.* "LLOYD'S MACHINERY CERTIFICATE"), indicating that the machinery and boilers are certified to be in good order and safe working condition.

12. In order to facilitate this inspection, the plans of the machinery and boilers are to be examined and from them the working pressure fixed.

13. In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions:—(*See* Circular, No. 438* page 79.)

1. The material of stays and of plates not exceeding 1 inch in thickness is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section.

   In plates above 1 inch and not more than 1⅞ inch in thickness the ultimate strength must not be less than 26 and not more than 29 tons per square inch, and in plates above 1⅞ inch in thickness the ultimate strength must not be less than 26 tons and not more than 28 tons per square inch.

   In all cases the ultimate elongation must not be less than 20 per cent. in a length of 8 inches.*

   It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red, and quenched in water of 82° Fahrenheit.

2. Steel rivets are to be considered as part of the material, and in addition to being subjected to a shearing test they must be capable of withstanding the same tests as the plates are required to undergo.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the construction of boilers.

4. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.

5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.

6. No steel stays are to be welded.

7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

14. The Surveyors will be guided in fixing the working pressure by the tables and formulæ annexed.

15. Any novelty in the construction of the machinery or boilers to be reported to the Committee.

16. The boilers, together with the machinery, to be inspected at different stages of construction.

17. The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice the working pressure, and carefully gauged while under test.

18. Two safety valves to be fitted to each boiler and loaded to the working pressure in the presence of the Surveyor. If common valves are used, their combined areas to be at least half a square inch to

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor; the accumulation in no case to exceed 10 per cent. of the working pressure.

19. An approved safety valve also to be fitted to the super-heater.

20. In Winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

21. Each valve to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety-valve spindles to extend through the covers and be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

22. Stop-valves to be fitted so that each boiler can be worked separately.

23. Each boiler to be fitted with a separate steam gauge, to accurately indicate the pressure.

24. Each boiler to be fitted with a blow-off cock independent of that on the vessel's outside plating.

25. The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyor

26. Gauges of an approved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

27. The engines are to be fitted with two feed-pumps, each capable of supplying the boilers; th pumps, &c., to be so arranged that either can be overhauled whilst the other is at work.

28. The engines are to be fitted with two bilge pumps which are to be so arranged that either can be overhauled whilst the other is at work.

29. In engines of 70 H.P. and under, one feed-pump and one bilge pump will be deemed sufficient, provided they are of adequate capacity.

30. A bilge injection, or a bilge suction to the circulating pump, is to be fitted.

31. The engine bilge pumps are to be fitted capable of pumping from each compartment of the vessel. (*See* Section 38.) The mud boxes and roses in engine room are to be placed where they are easily accessible, and to the satisfaction of the Surveyor.

32. A donkey pump is to be provided capable of supplying the boilers with water. A donkey is to be so fitted as to pump from each compartment, to deliver water on deck, and if no hand pump is fitted in engine room, it must be fitted to work by hand.

33. All steam and feed pipes are to be of copper and of a thickness to the satisfaction of the Surveyor.

34. All discharge-pipes to be, if possible, carried above the deep load-line, and to have discharge-valves fitted on the plating of the vessel in an accessible position.

35. No pipes to be carried through the bunkers without being properly protected.

36. Bilge suction-pipes to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

## COCKS, PIPES, AND SEA CONNECTIONS.

37. With a view to ensuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows, in all new vessels and vessels having *new engines or boilers*:—

38. All sea-cocks to be fitted on the plating of the vessel above the level of the stoke-hold and engine-room platforms, or attached to Kingston valves of a height sufficient to lift them up to the level of these platforms.

39. The bolts securing all cocks or sea connections to the plating of the vessel are to be tapped into the plating of the vessel or fitted with countersunk heads.

40. The blow-off cocks on the plating of the vessel are to be fitted with spigots passing through the plating, and a brass or gun metal ring on the outside. The cocks are to be so constructed that the key or spanner can only be taken off when the cock is shut.

41. Cocks and valves connecting all suction pipes to be fixed above the stoke-hold and engine-room platforms.

42. The arrangements of pumps, bilge injections, suction and delivery pipes, to be such as will not permit of water being run from the sea into the vessel by an act of carelessness or neglect. Any defective arrangement to be reported to the Committee. (*See* also page 20.)

## SPARE GEAR.

43. The articles of spare gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz. :—

2 connecting rod top-end bolts and nuts
2 connecting rod bottom-end bolts and nuts
2 main bearing bolts
1 set of coupling bolts
1 set of feed and bilge pump valves
1 set of piston springs (where common springs are used)
A quantity of assorted bolts and nuts
Iron of various sizes

In addition to the foregoing the following articles are recommended to be carried with a view to expedite repairs and lessen delay in distant ports, viz. :—

Crank shaft
Propeller shaft
Propeller, or a full set of blades
Stern bush, or lignum vitæ lining for bush
Air pump rod
1 pair of cross head brasses
1 set of link brasses
1 cylinder escape valve and spring
1 eccentric strip complete
6 junk ring bolts
Circulating pump rod
H. P. valve spindle
L. P. valve spindle
1 set of check valves
1 pair of connecting rod brasses
6 cylinder cover bolts
4 valve chest cover bolts
2 dozen boiler tubes
3 dozen condenser tubes
1 set of safety valve springs

## REPORTS ON VESSELS.

**Section 40.** 1. The Surveyors, in submitting their Reports of vessels not already classed, are in all cases, where practicable, to forward a sketch of the midship section, and other drawings where necessary, to be furnished by the builders, with figured dimensions of the component parts marked thereon.

2. Builders wishing to adopt plans other than those described herein, are to submit them through the Resident Surveyors (who are to state their opinions thereon), for the Committee's consideration and approval.

## THREE DECKED STEAM-VESSELS.

**Section 41.** 1. Steam vessels not less than 15 feet depth of hold to the middle deck, having two or more complete decks laid and caulked, and a tier of hold beams, or extra strong beams, or web frames

and stringers in lieu thereof, will have their scantlings determined as follows :—Such vessels to be denoted in the Register Book, " 3Dks," or " 2Dks3trB.," or " 2Dks&web frames," as the case may be.

2. The scantlings of the frames, reversed frames and floor-plates, the thickness of bulkheads, and diameter of pillars, are determined by the number produced by the deduction of *seven feet* from the sum of the measurements in feet, arising from the addition of the half-moulded breadth of the vessel amidships, the depth from the upper part of the keel to the top of the *upper deck beams*, and the girth of the half midship frame section measured from the centre line at the top of keel to the *upper deck stringer* plate.

3. The scantlings of the keel, stem, sternpost; the thickness of the outside plating, keelson and stringer plates, and deck; also the scantlings of the angle irons on beam stringer plates, and keelson and stringer angle irons in hold, as in Tables G 1, G 2, and G 4, are governed by the number obtained by multiplying that which regulates the size of the frames, &c., by the length of the vessel.

4. All the frames are to extend to the upper deck stringer plate.

5. The reversed frames are to extend to the upper part of the middle deck beam stringer angle iron, and to the upper part of the frames alternately.

6. The plating to be of the thickness given in Table G 1 from the keel to the gunwale; the sheerstrake to be placed at the gunwale, and the strake of plating in way of the middle deck to be an outside strake.

7. The upper deck stringer plate to be of the breadth and thickness prescribed in Table G 4. The middle deck stringer plate to be of the same breadth, and one-sixteenth of an inch less in thickness, and it is to be fitted and connected to the outside plating by angle irons between the frames of the size given for beam stringer angle iron; and in addition, an inner stringer angle iron of the same size, passing continuously fore and aft, must be riveted to reversed angle iron on each frame, and to the stringer plate—the space between this angle iron and the outside plating, all fore and aft, to be filled in and made water tight. Similar angle irons are to be riveted to the stringer plate, reversed frames, and outside plating, at the lower deck stringer.

8. The butt-straps of the sheerstrake and upper and middle deck stringer plates, and of not less than three strakes of plating at the bilge, to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted, for half the vessel's length amidships, and otherwise as per Section 20.

9. In these vessels, a side intercostal keelsen is to be fitted and attached to the outside plating by angle irons of not less size than $3 \times 3 \times \frac{7}{16}$; but if the plating number is 21,700 or above, then these angle irons must not be less that $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$. When a double bottom is fitted, this keelson may be dispensed with in the range thereof.

10. The thickness of the flat of upper deck is to be as given in Table G 2. In all cases a middle deck is to be properly laid and caulked, the thickness of which may be one-half inch less than that prescribed for the upper deck.

11. Engine room hatchways on the middle deck are to be enclosed by iron trunk bulkheads, efficiently strengthened, and extended from the middle deck to the upper deck, as prescribed in Section 29.

12. If in such vessels the length exceeds *eleven* times the depth taken from the *upper part of the keel* to the top of the *middle deck beams*, additional strength will be required at the bilge and bottom, as per Section 46; but no additional strength at the sheerstrake and stringer plate will be needed until the length exceeds *eleven* times the depth taken from *the upper part of the keel* to the top of the *upper deck*

*beams;* when this is the case, additional strength will be required in the *upper deck* sheerstrakes, as per Section 46, relating to vessels' proportions.

## SPAR-DECKED STEAM VESSELS.

**Section 42.** 1. Vessels noted in the Register Book as "Spar-deck" are those which are of lighter construction* than vessels built under the Three-decked rule, having the same dimensions, taken with reference to the total depth to the spar or upper deck in either case.

2. They must have three tiers of beams and be not less than 15 feet depth of hold to the main deck. The Committee, however, will approve of the construction of Spar-deck vessels having a less depth of hold provided the plans be in the first instance submitted for approval. For such vessels, having less than 15 feet depth of hold, a minimum freeboard must also be submitted to the Committee for approval, and the freeboard sanctioned is to be inserted in the Certificate and in the Register Book and marked on the ship's sides.

3. In cases where erections are required on the spar deck, plans must be submitted showing the additional strengthening proposed, which must be to the satisfaction of the Committee.

4. In such vessels the scantlings and arrangements are to be regulated by the dimensions under the main deck, as in those having one or two decks.†

5. *All* the frames must extend to the spar-deck stringer plate.

6. The reversed angle irons on the frames are to extend to the upper part of the main deck beam stringer angle iron, and to the upper part of the frames, alternately.

7. When the plating number is under 13,100, the plating from the main to the spar-deck sheerstrake must not be less than six-sixteenths of an inch in thickness; if 13,100 and under 16,600, it must not be less than seven-sixteenths of an inch in thickness; and if 16,600 and under 30,900 it must not be less than eight-sixteenths of an inch; and if 30,900 or above, it must not be less than nine-sixteenths of an inch in thickness.

8. A reduction of two-sixteenths of an inch from the thickness required by Table G 1 for the main-deck sheerstrakes, and from that given in the upper line of Table G 4 for stringer and tie-plates, will be allowed for those of the spar-deck.

9. The butt-straps of the spar and main-deck sheerstrakes and stringer plates, and of not less than three strakes of plating at the bilges, to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted for half the vessel's length amidships, and otherwise as per Section 20.

10. In these vessels, a side intercostal keelson is to be fitted, and attached to the outside plating by angle irons of not less than $3 \times 3 \times \frac{7}{16}$; but if the plating number is 21,700 or above, then these angle irons must not be less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$. When a double bottom is fitted, this keelson may be dispensed with in the range thereof.

11. The lower edge of the main sheerstrake must not be more than one-half its depth below the main-deck stringer plate.

12. The main-deck stringer plate is to be fitted and connected to the sheerstrake by angle irons

* This does not necessarily imply that the vessel is of less strength in relation to the amount of dead-weight carried at a suitable load line.

† Where the height between the main and spar decks is eight feet or above at any part, additional transverse strength will be required to the satisfaction of the Committee.

between the frames, of the size given for beam stringer angle iron, and in addition, an inner stringer angle iron of the same size, passing continuously fore and aft, must be riveted to reversed angle iron on each frame, and to the stringer plate; the space between this angle iron and the sheerstrake, all fore and aft, to be filled in and made water-tight. Similar angle irons are to be riveted to the stringer plate, reversed frames, and outside plating at the lower deck.

13. These vessels are to have a complete main deck $3\frac{1}{2}$ inches in thickness, properly laid and caulked; and a main deck sheerstrake of the thickness prescribed by Table G 1.

14. The flat of spar deck to be not less than $3\frac{1}{2}$ inches in thickness.

15. Engine-room hatchways on the main deck are to be enclosed by iron trunk bulkheads, efficiently strengthened and extended from the main deck to the spar deck. (*See* Section 29.)

16. The measurement of depth, for regulating the additional strength required for vessels of extreme proportions given in Section 46, is to be taken from the upper part of keel to the top of the *main deck beams.*

17. When Section 46 (relating to vessels' proportions) applies to these vessels, the increased strength defined for sheerstrakes is to be added to those of either the spar or main deck.

18. They are to have extra strength at the bilge and bottom in the proportion of their length to depth from main deck as prescribed in Section 46; they may, however, be 12 and under 13 depths in length before they are required to have the remaining extra strength prescribed for vessels of 11 to 12 depths in length, and such vessels exceeding the above proportions to have extra strength in the same relation to that prescribed for one and two-decked vessels.

19. Vessels to which this rule applies, as regards an entire spar deck, will be noted in the Register Book thus:—"*Spar dk.*"

## AWNING-DECKED STEAM VESSELS. (*See* N.B. at foot.)

**Section 43.** 1. An awning-decked vessel is one having a comparitively light superstructure fore and aft on the main deck proper of the vessel, intended to shelter passengers or cattle, or for the conveyance of cargo, either light in its nature or limited in quantity. In such vessels the scantlings and arrangements of the frames, reversed frames, the thickness of bulkheads, and diameter of pillars in Table G 1, are to be regulated by the dimensions under the main deck, as in a one or two-decked vessel, exclusive of the awning deck.

2. The plans of such vessels and a minimum freeboard must be submitted to the Committee for approval, and the freeboard thus sanctioned is to be inserted in the Certificate and in the Register Book, and marked on the ship's sides.*

3. Awning-decked vessels loading to a greater draught of water than thus indicated will thereby lose their character in the Register Book.

4. Vessels to which this rule applies, as regards an entire awning deck, will be noted in the Register Book thus, "*Awng dk.*"

* See Circular, No. 354, page 163 of Rules.

*N.B.—It is a condition on which an awning-decked vessel is classed in the Society's Register Book that the freeboard assigned shall be marked on the vessel's sides as above prescribed; and, under the provisions of Section* 43 *of the Society's Rules for Iron Ships, if the vessel be loaded to a greater draught of water than that assigned by the Committee, or if the mark indicating the maximum load draught be placed higher than the position assigned by the Committee, the vessel will thereby forfeit her Character in the Register Book.*

5. Such erections only as are necessary for navigating these vessels will be allowed on the awning deck, unless plans are submitted to, and approved by, the Committee.

6. All the main frames must extend to the awning-deck stringer plate, or to the lower part of the curve when of a rounded form at the gunwale. To be of the size given in Table G 1, but in no case to be less than $3 \times 3 \times \frac{6}{16}$.

7. The whole of the reversed frames are to be extended to the top of the main-deck stringer angle iron.

8. All the side plating above the main sheerstrake in vessels whose number is under 13,100 to be not less than five-sixteenths of an inch in thickness; if of that number, and under 18,700, to be not less than six-sixteenths; if of that number or above, to be not less than seven-sixteenths of an inch in thickness.

9. The awning-deck stringer plate to be of the breadth given in Table G 4 for hold beam stringers, and to be not less than six-sixteenths of an inch in thickness where the plating number is under 14,000, and seven-sixteenths where the plating number is 14,000 or above. When the number for plating exceeds 30,900, or the vessel exceeds thirteen depths in length to the main deck, special arrangements must be made for affording the requisite longitudinal strength at the gunwale, to the satisfaction of the Committee.

10. The tie plates to be of the same thickness as given above for the stringer plates, and to be in breadth as in Table G 4 for main deck tie-plates.

11. The butts of the awning-deck side plating above the main deck, and of the awning deck stringer and tie-plates, are to be double riveted.

12. A reduction of one-fourth from the thickness prescribed for the main deck will be allowed for the flat of awning deck.

13. The beams to be of the sizes given in Table G 3. They are to be placed at every alternate frame, and, if the vessel is of a rounded form at the gunwale, to scarph the main frames not less than eighteen inches, and to be properly riveted to them.

14. Engine-room hatchways on the main deck are to be enclosed by iron trunk bulkheads, efficiently strengthened and extended from the main deck to the awning deck; and the comings to the engine-room skylight not to be less than two feet above the awning deck. (*See* Section 29.)

15. Rounded gunwale plating to be not less in thickness than required for the awning-deck stringer plate, and to have a gunwale angle iron of the size required by Table G 2.

16. The gunwale must be properly constructed to the satisfaction of the Surveyors.

17. The main-deck stringer plate is to be fitted and connected to the sheerstrake by angle iron between the frames, of the size given for beam stringer angle iron; and, in addition, an inner stringer angle iron of the same size, passing continuously fore and aft, must be riveted to reversed angle iron on each frame, and to the stringer plate; the space between this angle iron and the sheerstrake, all fore and aft, to be filled in and made water-tight.

## POOPS, FORECASTLES, AND BRIDGE HOUSES.

**Section 44.** 1. In full poops, forecastles, and bridge-houses, a reduction of one-fourth from the dimensions which would be required in the same range, if the vessel were flush-decked (exclusive of

additions for extreme proportions) will be allowed in the outside plating, stringer and tie-plates upon beams, angle iron on stringer plates, and flat of deck. In no case need the side plating exceed the thickness required for awning-decked vessels.

2. All frames to extend to the poop or forecastle stringer plate, or to the lower part of the curve when of a rounded form at the gunwale, and a continuous angle iron of the size given for the upper deck stringer angle iron is to be wrought on the upper deck stringer plate inside the frames, as prescribed in Section 16, paragraph 9. The beams to be of the size given in Table G 3, and they are to be efficiently pillared. A beam to be placed at every alternate frame to scarph the main frames not less than eighteen inches, and to be properly riveted to them.

3. The rounded gunwale plating may be of the thickness required for the poop or forecastle stringer plates. The gunwale must be properly constructed to the satisfaction of the Surveyors.

4. Poop and bridge-house bulkheads in steam vessels to be of the thickness of their side plating, with coming plates one-sixteenth of an inch thicker than their bulkheads, and to be stiffened with bulb plates of not less size than those required for forecastle beams, and angle irons of the size required for the vessel's revease frames, spaced 30 inches apart, and connected both to the coming plates and to the deck plating, or to an athwartship plate on the beams both below and above, with a bracket-plate to each end of the bulb stiffener; or other equivalent strength introduced.

5. Where the poop exceeds one-fourth of the vessel's length, the upper deck stringer plate and sheerstrake are to be either increased in thickness or doubled, in way of the break, for a length of from twenty to thirty feet, or increased strength at this part may be obtained in any other way, if to the satisfaction of the Surveyors.

6. In top-gallant forecastles of vessels whose plating number is 18,000 and above, the alternate reversed frames are to extend to the forecastle desk, or a double angle iron stringer of the size required for reversed frames is to be fitted inside the frames midway between the upper and forecastle decks, connected at the fore-end by an efficient breasthook; or other equally efficient means of strengthening the forecastle may be adopted, if approved by the Committee.

7. Where it is proposed to fit a poop or top-gallant forecastle to a vessel under 14 feet depth of hold, the plans are to be submitted for the consideration of the Committee.

8. Where bridge-houses are fitted, the whole of the frames are to be extended to the height of the bridge-deck, or be connected to the stringer plates by knees and bracket plates, and the gunwale angle iron made continuous. Where efficient partial bulkheads are fitted, the alternate frames only need extend to the height of the bridge deck. When the frames are extended through the upper deck stringer plate there must be a continuous angle iron of the size given for upper deck stringer angle irons, wrought on the upper deck stringer plate, inside the frames.

9. Where the combined length of the poop, or raised quarter-deck, and enclosed bridge-house exceeds two-fifths the vessel's length, and the plating number is 15,000 and above, the sheerstrake should be doubled for one-half the vessel's length amidships, or other equivalent strength should be added, to the satisfaction of the Committee.

## RAISED QUARTER-DECKS AND SUNK FORECASTLES.

**Section 45.** 1. Side plating of raised quarter-decks and sunk forecastles may be one-sixteenth of an inch less in thickness than topside plating below it, if the topside plating be seven-sixteenths of an inch in thickness or more.

2. The frames in all cases, and the reversed angle irons on alternate frames, are to extend to the raised quarter-deck and forecastle stringer plate.

3. The upper deck beam stringer plate is to maintain its breadth to the break of the quarter-deck, and then it may be gradually reduced in breadth until it terminates at the fourth frame abaft the break, and it is to be fitted and riveted to the outside plating. The upper deck sheerstrake is to extend to the stern. The front or break bulkhead of the raised quarter-deck is to be stiffened by a thwartship plate, of not less size than the upper deck beam tie-plates, and efficiently connected to it by angle iron; this thwartship plate is to receive the deck ends, and is to be supported by bracket plates when not riveted to a beam.

4 Where the raised deck is less than one-quarter of the vessel's length, a reduction of one-fifth from the thickness which would be required in the same range if the vessel were flush decked will be allowed in the stringer and tie-plates upon beams, and angle iron on stringer plates and the flat of the deck, but no such reduction is to be made where the length of the raised quarter-deck exceeds the above limits

5 Where the raised deck exceeds one quarter of the vessel's length, the number and arrangement of the hold beams, beam stringers and stringers in hold, must be in accordance with the Rules for the increased depth of the vessel, and the height of the reversed angle irons on the frames is to be regulated by the number of scantlings which the increased depth would give. The main sheerstrake should be doubled, or increased in thickness, for a reasonable distance before and abaft the break; the side plating of the raised deck should be increased in thickness at the break, and be extended for some distance before the break; the butts of this plating, the main sheerstrake, and the strake of plating next below must be treble riveted in the neighbourhood of the break, and the butt-straps be one-sixteenth of an inch thicker than the plates they connect. The main deck stringer plate should extend abaft the break, about seven frame spaces, and the raised deck stringer plate about four frame spaces before the break, and the stringer plates below the main deck should have a shift of about sixteen feet overlap, or the necessary strength may be obtained by other arrangements if approved by the Surveyors. *The size of beams of raised quarter-decks to be regulated as prescribed in Table* G 3.

6. Where an iron deck is required to be fitted by the rules, and is severed at the break, its continuity of strength is to be maintained by efficient brackets securely attached to the break bulkhead and to the iron deck before and abaft the same, or otherwise arranged to the satisfaction of the Surveyors.

7. Where the combined length of the poop, or raised quarter-deck, and enclosed bridge-house, exceeds two-fifths the vessel's length, and the plating number is 15,000 and above, the sheerstrake should be doubled for one-half the vessel's length amidships, or other equivalent strength should be added, to the satisfaction of the Committee.

# VESSELS OF EXTREME PROPORTIONS

**Section 46.** 1. In the following cases additional longitudinal strength, beyond that stated in the foregoing rules, and in Tables G 1 and G 2, will be required. For stringer plates and iron decks, *see* Table G 4.

2. *The length, breadth, and depth to be taken as per Section* 1.

3. In all cases where keelsons, or other additions, are required for a certain portion of the length of a vessel, care should be taken to avoid any abrupt termination of this additional strength, by tapering the keelsons, &c., beyond these limits, and properly shifting their terminations.

## VESSELS ABOVE 11 AND NOT EXCEEDING 12 DEPTHS IN LENGTH.

4. **Plating Number under 18,700.** The sheerstrake to be increased one-sixteenth of an inch in thickness for three-fourths the vessel's length amidships.

5. To have a bulb plate of the dimensions required for the midship beam plate, placed between and riveted to, the double angle iron bilge keelson for one-half the vessel's length amidships.

6. To have one strake of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, or one-half the vessel's length amidships.

7. **Plating No. 18, 700 and under 23,000.** The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships.

8. To have a bulb plate of the dimensions of the midship beam plate, placed between and riveted to the double angle iron bilge keelson for three-fifths the vessel's length amidships.

9. And to have two strakes of plating at the bilge one-sixteenth of an inch thicker than given in Table G 1, for one-half the vessel's length amidships.

10. **Plating No. 26,000 and under 35,000.** The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below increased one-sixteenth of an inch for half the vessel's length amidships.

11. To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

12. To have also a bulb plate of the same size as the above, fitted to the side intercostal keelson for one-half the vessel's length amidships.

13. To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for half the length of the vessel amidships.

14. **Plating No. 35,000 and under 40,000.** The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships and the strake below it one-sixteenth of an inch for half the length amidships.

15. To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be, in depth, sufficient to take the deep flanges of the double angle irons on top and bottom and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one half the vessel's length amidships.

16. To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. To have a bulb plate of the size required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

17. And to have intercostal plates fitted between the upper bilge stringer angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

## VESSELS ABOVE 12 AND NOT EXCEEDING 13 DEPTHS IN LENGTH.

18. **Plating No. under 18,700.** The sheerstake to be increased in thickness two-sixteenths of an inch, for three-fourths the vessel's length amidships.

19. To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

20. To have two strakes of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

21. **Plating No. 18,700 and under 26,000.** The sheerstake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

22. To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

23. And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or to have in lieu thereof three strakes of plating at the bilge one-sixteenth of an inch thicker than required by Table G 1, for the same length.

24. **Plating No. 26,000 and under 35,000.** The sheerstrake and the strake below it to be increased two-sixteenths of an inch in thickness for three-fourths and one-half the vessel's length amidships respectively, and the upper deck stringer plate to be increased one-sixteenth of an inch in thickness for three-fifths the vessel's length amidships.

25. To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

26. Also to have a bulb plate of the same size as the above, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships. To have an intercostal bilge keelson fitted for half the vessel's length amidships and attached to the outside plating.

27. And to have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships.

28. **Plating No 35,000 and under 40 000.** The sheerstrake to be doubled below the stringer plate with plates not less than 20 inches broad in long lengths and of the thickness of the topside plating, for

three-fourths the vessel's length amidships, and the upper deck stringer increased two-sixteenths of an inch in thickness for half the length amidships.

29. To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be, in depth, sufficient to take the deep flanges of the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

30. To have intercostal plates fitted and attached to the outside plating at the bilge keelson for one half the vessel's length amidships, and to have a bulb plate of the same size as that given above, attached thereto, and to the keelson angle irons, for three-fifths the vessel's length amidships.

31. To have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

## VESSELS ABOVE 13 AND NOT EXCEEDING 14 DEPTHS IN LENGTH.

32. **Plating No. under 10,450.** The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths of the vessel's length amidships, and the strake next below it to be increased one sixteenth of an inch for one-half the vessel's length amidships.

33. To have a bulb plate of the dimensions required for the midship beam plate, placed between and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

34. To have also an additional bulb plate of the same size as above, fitted between the upper bilge stringer angle irons for one-half the length of the vessel amidships.

35. To have in all cases a side keelson formed of double angle irons, about midway between the bilge and middle line keelson.

36. And to have two strakes of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel s length amidships.

37. **Plating No. 10,450 and under 15,500.** The sheerstrake to be doubled below the stringer plate with plates not less than 18 inches broad in long lengths, and of the thickness of topside plating, for three-fifths of the vessel's length amidships.*

38. To have a bulb plate of the dimensions required for the midship beam plate, placed between and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

39. Where hold beams are not fitted, there is to be an additional bulb plate of the same size as the above fitted between the upper bilge stringer angle irons for one-half the length of the vessel amidships.

40 To have also a side intercostal keelson fitted between double side keelson angle irons, and attached to the outside plating, extending as far forward and aft as practicable.

41. In addition to the above, two strokes of plating at the bilges are to be one-sixteenth of an inch thicker than given in Table G 1, for one-half the vessel's length amidships.

42. **Plating No. 15,500 and under 18,700.** The sheerstrake to be doubled below the stringer plate with plates not less than 20 inches broad, in long lengths, and of the thickness of the topside plating, for three-fifths the vessel's length amidships.

43. To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

* When it is required to double the sheerstrake for a portion of its breadth, the topside strake may in lieu thereof be doubled its whole breadth for the same length.

44. And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof three strakes of plating at the bilge are to be increased one-sixteenth of an inch in thickness beyond that required by Table G 1, for the same length.

45. **Plating No. 18,700 and under 26,000.** The sheerstrake to be doubled below the stringer plate with plating not less than 20 inches broad, in long lengths, and of the thickness of the topside plating, for three-fifths the vessel's length amidships, and the upper deck stringer plate to be increased one-sixteenth of an inch in thickness for one-half the vessel's length amidships.

46. To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths of the vessel's length amidships.

47. And to have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships.

48. **Plating No. 26,000 and under 35,000.** The sheerstrake to be doubled below the stringer plate with plates not less than 20 inches broad, in long lengths, and of the thickness of the topside plating, for three-fourths the vessel's length amidships, and the stringer plates increased two-sixteenths of an inch for three-fifths the vessel's length amidships.

49. To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

50. To have a bulb plate of the size required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

51. To have intercostal plates fitted and riveted between the bilge keelson angle irons and attached to the outside plating for half the vessel's length amidships.

52. To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

53. And the middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for half the length amidships, tapered forward and aft to the depth given in the Table.

54. **Plating No. 35,000 and under 40,000.** The sheerstrake to be doubled its whole depth as far as practicable for three-fourths the vessel's length amidships, the next strake below it increased two-sixteenths of an inch in thickness for half the vessel's length, and the upper deck stringer plate increased two-sixteenths of an inch for three-fifths the vessel's length amidships.

55. To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

56. To have an intercostal bilge keelson attached to the outside plating for half the vessel's length amidships; and to have a bulb plate of the same size as that given above attached thereto, and to the keelson angle irons, for three-fifths the vessel's length amidships.

57. To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

58. The middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for one-half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

## VESSELS ABOVE 14 AND NOT EXCEEDING 15 DEPTHS IN LENGTH.

59. **Plating No. under 10,450.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than eighteen inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships.

60. To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

61. To have a bulb plate of the same size as the above fitted between the upper bilge stringer angle irons for one-half the vessel's length amidships.

62. To have in all cases a side keelson formed of double angle irons, about midway between the bilge and middle line keelson, with a bulb plate between of the size given above.

63. And to have an intercostal stringer fitted at the upper turn of bilge and attached to the outside plating for half the vessel's length amidships, or in lieu thereof one strake of plating at the bilge, doubled for the same length.

64. **Plating No. 10,450 and under 15,500.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships.

65. To have a bulb plate of the dimensions required for the midship beam plate, fitted to the bilge keelson for three-fifths of the vessel's length amidships.

66. To have a side intercostal keelson attached to the outside plating extending as far forward and aft as practicable.

67. And to have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof to have one strake of plating at the bilge doubled for one-half the vessel's length amidships.

68. **Plating No. 15,500, and under 18,700.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the length of the vessel amidships.

69. To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fiths the vessel's length amidships.

70. To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof one strake of plating at the bilge to be doubled for the same length.

71. **Plating No. 18,700 and under 26,000.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships, and the upper deck stringer plate increased two-sixteenths of an inch in thickness for one-half the vessel's length amidships.

72. To have a bulb plate of the dimensions required for the midship beam plate, fitted to the bilge keelson for two-thirds of the vessel's length amidships.

73. Also to have a bulb plate, of the same size as the above, fitted to the side intercostal keelson for one-half the vessel's length amidships.

74. To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships.

75. And the middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for half the length amidships, tapered forward and aft to the depth given in the Table.

76. **Plating No. 26,000 and under 35,000.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships; the strake next below it to be increased two-sixteenths of an inch for half the length, and the upper deck stringer plate to be increased two-sixteenths of an inch for three-fifths the vessel's length amidships.

77. To have a continuous plate keelson standing on the floors, and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be in depth sufficient to take the deep flanges of the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

78. To have an intercostal plate fitted and riveted between the bilge keelson angle irons, and attached to the outside plating for three-fifths the vessel's length amidships, with a bulb plate, of the size given above, attached thereto, and extending two-thirds the length of the vessel amidships.

79. To have an intercostal plate riveted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

80. The middle line keelson to be one-fourth deeper than required by Table G 2, for one-half the vessel's length amidships, tapered forward and aft to the depth given in the Table

81. **Plating number 35,000 and under 40,000.** The sheerstrake and the strake below it to be doubled their whole breadth, with plates of the thickness of the topside plating for three-fourths and one-half the vessel's length amidships, and the upper deck stringer plate doubled for a breadth of forty-two inches for three-fifths the vessel's length amidships.

82. To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

83. To have an intercostal bilge keelson attached to the outside plating for three-fifths the vessel's length amidships, with a continuous plate keelson standing on the floors, and attached to the intercostal plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be in depth sufficient to take the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

84. To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

85. The middle line keelson in these vessels to be one-fourth deeper than required by Table G 2, for half the length amidships, tapered forward and aft to the depth given in the Table.

## VESSELS ABOVE 15 AND NOT EXCEEDING 16 DEPTHS IN LENGTH.

86. **Plating No. under 15,500.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty inches broad and of the thickness of the strake next below it, for three-fourths of the vessel's length amidships.

87. To have a bulb plate of the dimensions required for the midship beam plate, fitted to the bilge keelson for three-fifths the vessel's length amidships.

88. To have a side intercostal keelson attached to the outside plating, extending as far forward and aft as practicable.

89. To have intercostal plates fitted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships, or in lieu thereof to have one strake of bilge plating doubled for one-half the length amidships.

90. **Plating No. 15,500 and under 18,700.** The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three fourths the length of the vessel amidships.

91. To have, in addition to the side intercostal keelson, intercostal plates fitted between the bilge keelson angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

92. To have also intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof one strake of plating at the bilge, to be doubled for the same length.

93. **Plating No. 18,700 and under 26,000.** The sheerstrake to be doubled its whole breadth with plates of the thickness of the topside plating, for three-fourths the vessel's length amidships, and the upper deck stringer plate increased two-sixteenths of an inch in thickness for one-half the vessel's length amidships.

94. To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

95. To have intercostal plates fitted and riveted between the bilge keelson angle irons, and attached to the outside plating for half the vessel's length amidships, with a bulb plate of the size given above attached thereto, and extending three-fifths the length of the vessel amidships.

96. To have intercostal plats riveted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

97. The middle line keelson to be one-fourth deeper than required by Table G 2, for half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

98. **Plating No. 26,000 and under 35,000.** The sheerstrake to be doubled its whole breadth with plates of the thickness of the topside plating for three-fourths the vessel's length amidships; and the strake of plating next below it doubled its whole breadth with plates of the same thickness for three-fifths the length amidships, and the upper deck stringer plate doubled for a breadth of forty inches with plates of its own thickness for half the vessel's length amidship.

99. To have a continuous plate keelson standing on the floors, and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in

Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

100. To have an intercostal bilge keelson attached to the outside plating for three-fifths the vessel's length amidships, with a bulb plate of the size given above attached thereto for two-thirds the vessel's length amidships.

101. To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

102. The middle line keelson to be one-fourth deeper than required by Table G 2, for half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

103. **Plating No. 35,000 and under 40,000.*** The sheerstrake and two strakes below it to be doubled with plates of the thickness of the topside plating for three-fourths, three-fifths, and one-half the vessel's length amidships respectively; and the upper deck stringer plate to be doubled a breadth of fifty inches with plates of its own thickness for three-fifths the vessel's length amidships.

104. To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

105. To have an intercostal bilge keelson attached to the outside plating for three-fifths the vessel's length, with a continuous plate keelson, standing on the floors and attached to the intercostal, having double angle irons on its upper and lower edges, of the size given in table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth and the same thickness as given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

106. To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

107. The middle line keelson in these vessels to be one-fourth deeper than required by Table G 2, for half the vessel's length amidships, tapered forward and aft to the depth given on the Table.

108. **For all VESSELS EXCEEDING SIXTEEN DEPTHS IN LENGTH to the Middle Deck, and Vessels the plating No. of which is above 20,000, and which exceed thirteen depths in length, to the Upper Deck, plans must be submitted for the approval of the Committee for giving the Vessel sufficient additional strength longitudinally.**

## VESSELS NOT BUILT UNDER SURVEY.

**Section 47.** 1. In cases of vessels not surveyed while building, for which a character may be required, application must be made to the Committee in writing, who will direct a special examination to be made by two Surveyors of the Society (one of whom shall be an exclusive officer), for which purpose the vessel is to be placed on high blocks in a dry dock or on ways; the hold to be cleared and proper stages made; the rivets and plating of keel, and flat of bottom, thoroughly examined; the close

* All vessels, excepting those with an awning deck, whose plating No. exceeds 35,000 and exceeding 16 depths in length taken from the main deck, are to have the whole of the reverse frames extended to the gunwale for half the vessel's length amidships, or a sufficient number of partial bulkheads fitted in the 'tween decks to the approval of the Committee. In the case of awning-deck vessels they are all to extend to the main deck.

ceiling in the hold to be removed where deemed necessary, and coal bunkers of steam vessels to be cleared; the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets, and inner surface of the plating exposed to view;* all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder; and the planksheers and waterways, if of wood, to be scraped bright. When the vessel is so prepared, the Surveyors are to ascertain by drilling the thickness of the plating in such parts as they may deem necessary, also the condition of all the parts of iron above named, and of the planksheers, waterways, flat of decks, and their fastenings; and send a detailed report thereon, stating the dimensions and quality of the materials and workmanship, to the Committee, who will then assign the vessel such character as the facts may appear to them to warrant.

2. In addition to the above, the Special Surveys Nos. 1, 2, and 3 described on pages 18 and 70 & 71 of the Rules must be complied with, regulated by the age of the vessel, as in the case of vessels built under survey, and the periodical surveys are also to be held as in the case of vessels built under survey.

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if the coating be carefully inspected, and tested by beating or chipping, and found sound and adhering satisfactorily to the iron, its removal may be dispensed with, provided that upon the removal of a portion, the plating, frames, and rivets under it be found in satisfactory condition.

# IRON SHIPS.

## CLASSED UNDER REGULATIONS PREVIOUSLY PASSED FOR THE BUILDING AND CLASSIFICATION OF IRON SHIPS.

All vessels will be classed A so long as on careful annual and periodical *special* surveys they are found to be in a fit and efficient condition to carry dry and perishable cargoes to and from all parts of the world. (*See* N.B. at foot.)

Differences of construction, as regard thickness of plating, strength, and probable durability, &c., will be indicated by the letters A, B, and C placed inside the letter A,—thus, A A A.

A A will denote that the vesssels have been built in accordance with, or equal to, the Rules and Table G.

A will denote vessels which are considered entitled to the A character, but which have not been built in accordance with the Rules.

All vessels to be subject to occasional or annual survey when practicable.

To entitle Ships to retain their respective characters in the Register Book, the following Special Surveys must be held periodically :—

**Survey No. 1.**—The vessel to be placed on blocks of sufficient height in a dry dock, or on ways; the limber boards, and ceiling equal to one strake fore and aft on each side removed, with both surfaces of outside plating exposed.*

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. For periodical Surveys of engines and boilers, *see* pages 20 & 21.

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency. Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

**Survey No. 2.**—The vessel to be placed on blocks of sufficient height in a dry dock, or on ways; the limber boards, and ceiling equal to *three* strakes fore and aft on each side removed, with both surfaces of outside plating exposed.*

The windlass at this and all subsequent alternate special surveys to be unhung where necessary, and its wood linings sufficiently stripped for examination. The chain cables are also to be ranged for inspection.

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with. Ships which have undergone the above examination will be noted in the Register Book thus, *s.s.No.*1–85, *s.s.No* 2-85, *s.s.No.*3-85; and if not submitted to such Survey, will be liable to have their character suspended.

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their characters from want of survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

In Steam Vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* pages 20 & 21.)

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water of the height of the light water-line to test their efficiency. Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

After a vessel has passed No. 3 Survey, in addition to the survey prescribed for No. 2 when that survey becomes due, ceiling should be lifted at other parts of the vessel where deemed necessary by the Surveyors to enable them to satisfy themselves as to the condition of the inside of the vessel.

**Survey No. 3**,—BY TWO SURVEYORS, ONE TO BE AN EXCLUSIVE OFFICER OF THE SOCIETY.—The vessel to be placed on blocks of sufficient height, in a dry dock, or upon ways; proper stages to be made, and the hold to be cleared, all the close ceiling in the hold to be removed, so that the rivets and plates of keel and flat of bottom may be thoroughly examined; coal bunkers of steam vessels to be cleared, the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers,* ends of beams, water-tight bulkheads, rivets, and inner surface of the plating, to be exposed; and where side lights are fitted, the condition of the plating in way of the same to be ascertained.† All oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder; so as to completely lay bare all the surfaces of iron; the plank sheers and waterways, if of wood, to be scraped bright. When the vessel is thus prepared, the Surveyors, if they deem necessary, are to ascertain the thickness of the plating by having holes drilled.

Such parts as may be found defective, or less than three-fourths of the required substance by Rule, are to be removed, and replaced with proper materials, equal in substance and quality, to the original construction. The plank sheers, waterways, flat of decks, and their fastenings, are also to be examined, and made good where necessary.

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* pages 20 & 21.)

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency. Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

Whenever the bottom plating is to be cemented, a survey is to be held prior to the cement being laid.

Every ship classed ⩓ or ⩔ must be submitted to a *special periodical survey* every *four* years:—the

*. Whenever the engines and boilers are taken out for repair, the engine and boiler bearers, with the floor-plates, keelsons, rivets, &c., under them may, at the request of the owners, be surveyed in anticipation of the above Rule.

† In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with. Ships which have undergone the above examination will be noted in the Register Book thus, *s.s.No.*1-85, *s.s.No.*2-85, *s.s.No.*3-85; and if not submitted to such Survey, will be liable to have their character suspended.

first Survey according to No. 1; the second according to No. 2; the third according to No. 3; and afterwards according to Nos. 1, 2, and 3 consecutively at intervals of four years.

Every ship classed ✠ must be submitted to a special periodical survey every *three* years, as per Nos. 1, 2, and 3, afterwards Nos. 1, 2, and 3 consecutively.

In all vessels classed ✠ and above, No. 3 Survey must be complied with before the expiration of thirteen years from the date of build, or the previous No. 3 Survey. In all vessels classed ✠, No. 3 Survey must be complied with before the expiration of ten years from the date of build, or the previous No. 3 Survey.

## RULES FOR THE SURVEY OF IRON SHIPS CLASSED FOR PERIODS OF YEARS.

All vessels thus classed to be subject to occasional or annual Survey when practicable, *and every third year to be specially surveyed* in dry dock or laid on blocks, with both surfaces of outside plating exposed;* and whenever the engines or the boilers of iron steam ships are taken out, the vessel shall be submitted to a particular and special Survey.

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* pages 20 & 21.)

## CONTINUATION OF IRON SHIPS TO THE CHARACTER A.

If, on the termination of the period of original designation, or if at any subsequent period, not exceeding one-half the number of years assigned originally, or on Restoration, an Owner shall wish to have his ship remain or be replaced on the letter A, he is to send a written notice thereof to the Secretary, and the Committee shall then direct a special Survey, as follows, to be held by not less than two competent persons, to be appointed by the Committee, one of them to be a Surveyor the exclusive servant of the Society.

### SURVEY.

The vessel to be placed on high blocks, in a dry dock, or upon ways, and proper stages to be made, so that the rivets and plates of keel, and flat of bottom, may be thoroughly examined; the whole of the ceiling of lining inside to be entirely removed; coal bunker of steam vessels to be cleared, so as to expose the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets, and inner surface of the plating, to view; the hold to be cleared; all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder, so as to completely lay bare all the surfaces of iron;* the planksheers and waterways, if of wood, to be scraped bright; and when the vessel is thus prepared, the Surveyors are to ascertain the thickness of the plating by having, if they deem necessary, holes drilled therein, also the condition of all the parts of iron above-named, and of the planksheers, waterways, flat of

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with. Ships which have undergone the above examination will be noted in the Register Book, thus *t.s.* ; and if not submitted to such Triennial Survey, will be liable to have their character suspended.

decks and their fastenings; and upon the Owner consenting to remove and replace with proper materials, equal in substance and quality to the original construction, such parts as may be found defective, or less than three-fourths of the required substance by Rule, such vessel, upon the repairs and efficiency being reported to the Committee, may be continued on the letter A for a term of years not exceeding one-half the number of years assigned originally, or on Restoration, subject to occasional or annual survey when practicable. The period of Continuation will, upon all occasions, commence from the time the ship may have gone off the letter A, without regard to the date when the survey for this purpose may be held. (*See* Special Survey No. 3, as regards examination of windlass, chain cables, double bottoms, machinery of steam ships, &c.)

## RESTORATION OF IRON SHIPS TO THE CHARACTER A.

If, *at any age of a vessel*, an Owner be desirous to have his ship restored, such Restoration, on his application to the Committee, and consenting to the special survey hereinafter described, to be held by two Surveyors, one of whom shall be an exclusive servant of the Society, and performing the repairs thereby found requisite, will be granted for a period not exceeding two-thirds of the time originally assigned, the same to be calculated from the date of such repairs.

## SURVEY AND REQUISITES FOR RESTORATION.

The vessel to be placed on high block, in a dry dock, or upon ways, and proper stages to be made so that the rivets and plates of keel, and flat bottom, may be thoroughly examined; the whole of the ceiling or lining inside to be entirely removed; coal bunkers of steam vessels to be cleared, the boilers to be taken out and also the engines (unless it shall be shown by previous survey that the removal is unnecessary), so as to expose the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets, and inner surface of the plating, to view; the hold to be cleared; all oxidation to be removed by being cut or beaten off the several parts above-named, also from the outside plating, rivets, keel, stem, sternpost, and rudder, so as to completely lay bare all the surfaces of iron;* the plank sheers and waterways, if of wood, to be entirely removed, and also the flat of upper deck, except under special circumstances, to be sanctioned by the Committee in each case, and when the vessel is thus prepared, the Surveyors are to ascertain the thickness of the plating by having if they deem necessary, holes drilled therein, also the condition of all the parts of iron above-named, and of the beams and their fastenings; and upon the Owner consenting to remove such parts as may be found defective, or objected to, or less in thickness than hereinafter admitted for repairing such vessel, and replace them with proper materials equal in quality and substance to that required in the Table G for the nine years' grade in those originally classed 12 A, and equal in quality and substance to that required in the Table G for the six years' grade in vessels originally classed 9 A or 6 A, such vessel, upon the repairs and efficiency being reported by the Committee, may be restored to the letter A, for a term of years not exceeding two-thirds the number of years assigned originally, subject to occasional survey.

Iron ships which have been Restored under the foregoing Rules shall be entitled to Continuation thereon subject to the same conditions of survey and examination as are prescribed for ships proposed to

be Continued at the expiration of the period first assigned to them; but, in like manner, the term of such extended Continuance to be limited to a period not exceeding one-half the number of years for which the ships may respectively have been restored, without reference to the period originally assigned to them. (*See* Special Survey No. 3, for examination of windlass, chain cables, double bottoms, machinery of steam ships, &c.)*

## IRON SHIPS ALREADY CLASSED A1

Iron ships built prior to the promulgation of the Rules will be allowed to remain in the Register Book classed A1 from year to year, *subject to annual survey*, until the expiration of Six Years from their date of build, and then be examined to determine the period to which they may be entitled under the Rules; and if, on such examination, it shall be found the ships are entitled to the 9 or 12 years' grade, it will be in the option of the Owners either to adopt such periods respectively, or continue the vessel A1 from year to year, as above, until the expiration of the extended period; but if it shall be found that the term of years for which a vessel would have been entitled to remain on the A character has expired, she will be classed Æ if entitled thereto, unless specially surveyed for Continuation or for Restoration

By order of the Committee,

BERNARD WAYMOUTH,
*Secretary.*

*No.* 2, *White Lion Court, Cornhill, London, E.C.*
1*st July*, 1885.

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with.

*For Ships built of Steel see page* 76.

No. 264.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## RULES AND REGULATIONS.

### IRON SHIPS.

With reference to notice No. 248, announcing the Committee's Resolution of the 6th January, to allow in the case of Iron Ships (not being Spar-decked Ships) built in conformity with the Rules in other respects for the ⩓ Class, *a reduction of one-sixteenth of an inch* in the thickness of outside plating for all parts from that heretofore prescribed in Table G attached to the Rules, and that Iron Ships which had been built upon the Rules hitherto in force, and classed ⩓, should be distinguished in the Register Book by an asterisk prefixed, thus *⩓.

NOTICE is hereby given, that in pursuance of a Resolution passed by the Committee this day, Ships only which may be built in conformity with the Rules for the ⩓ character in force prior to the 6th January, 1870, will be allowed that character, and will have an asterisk prefixed, thus *⩓. All other Iron Ships will be classed in accordance with the New Rules 100 A, 90 A, 80 A, or their intermediates.

The foregoing Resolution will apply to all Iron Ships built or contracted for after this date.

By order of the Committee,

GEORGE B. SEYFANG,
*Secretary.*

*No. 2, White Lion Court, Cornhill, London, E.C.*
*28th April*, 1870.

NOTICE, No. 436,* dated 19th May, 1881; amended 28th May, 1885.

*See* also NOTICE No. 552, following this NOTICE.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## SHIPS BUILT OF STEEL.

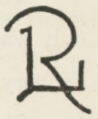
NOTICE is hereby given that the Committee of this Society have this day passed the following Resolutions, amending Notice No. 392 in regard to the classing of ships built of steel :—

1. In all cases where it is proposed to build ships of steel for classification in the Register Book, a sketch of midship section, with longitudinal and other plans showing the details of the scantlings and arrangements, must in the first place be submitted for the approval of the Committee, and the vessel, so approved, must be built under special survey.

2. A general maximum reduction of 20 per cent. in the thickness of the plating, frames, &c., of ships built of steel from that prescribed in Tables G 1, G 2, G 3, and G 4, for iron ships of the 90A grade or above will be allowed, subject to such modifications as may be deemed necessary by the Committee, according to the size of the vessel, when the plans, &c., are submitted for their approval.*

3. The steel to be used in ships building for classification in the Register Book will be required to withstand the whole of the following tests, to be applied at the steel works under the personal inspection of the Society's Surveyors, to samples selected by them from every charge or cast employed in the manufacture of the material, and these samples, when marked by them for testing, should be followed by the Surveyors through the different stages of preparation until the tests are completed.

4. The Committee will require that every plate, beam, and angle supplied for these ships shall be clearly and distinctly stamped by the manufacturer in two places, where the brand cannot be conveniently sheared off, after they have been tested, the brand to be similar to the following, thus :—denoting that a shearing from the plate or angle so marked has successfully been bent cold after being tempered as described in the temper test which follows, and that the plate or angle in question is capable of withstanding the whole of the tests hereafter described; and the Committee will require the Surveyors when in constant attendance at the steel works to satisfy themselves, so far as may be practicable, that these conditions are being complied with in a *bona fide* manner.†



5. Should the samples selected by the Surveyor not fulfil the test requirements, the plates or angles from which they were cut are to be rejected, and further tests are to be made before any material from the same charge can be accepted.

6. When one of the Society's Surveyors is not in constant attendance at the steel works for the purpose of seeing the material tested, the Committee will require that tensile and temper tests shall be applied either at the steel works or at the ship-yard to not less than one plate, angle bar, or bulb plate, in every batch of 50, or a batch of less number; but the Surveyor is not to select samples for testing until the material has been tested, stamped, and appropriated by the manufacturer. The samples

* The rivets, keel, stem, sternpost, rudder and pillars, the girders and top of double bottoms, fitted on ordinary floors, coal bunker bulkheads, casings round engines, hatchway comings, poops, forecastles, and deck erections may be of iron of the usual size, but no other parts of such ships are to be of iron without the special sanction of the Committee. When other parts are admitted of iron, the same will be denoted in the Register Book.

† As required in iron ships, all plates, beams, and angles to be legibly stamped in two places with the manufacturer's name or trade-mark, and the place where made, which is also to be stated in the report of survey.

No. 436* (*continued*).

when marked by the Surveyor for testing are to be followed by him when practicable through the different stages of preparation until the tests are completed. Should the samples tested not fulfil the test requirements, the whole of the material from the charge which produced the samples which fail to withstand the tests prescribed is to be rejected, or re-tested, and further tests are to be applied to a sample from each of the other charges of which the batch is composed. In the event of any of these samples also failing, the whole of the material from the same charge or charges is to be rejected, as in the first instance.

Before these sample tests have been applied to a batch of steel submitted for check testing, the Surveyor is to be furnished with a certificate by the manufacturer to the effect that the Society's requirements as to the testing of steel have been complied with in the case of the batch in question.



7. In the event of material failing, in any case, to withstand the prescribed tests, the brands approved by the Committee and stamped on the plates, beams, and angles by the manufacturer are to be defaced by punch marks extending beyond the brand in the form of a cross, thus :—denoting that the material is rejected.

8. The Society's Surveyor will require to have every facility placed in his way for tracing all plates, beams, and angles, to their respective charges, and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the tests applied to the material, he is to sign, to be forwarded by the manufacturers to the shipbuilders, and the other of which is to be retained by himself.

## TESTS.

Strips cut lengthwise or crosswise of the plate, and also angle and bulb steel, to have an ultimate tensile strength of not less than 28, and not exceeding 32 tons per square inch of section,* with an elongation equal to at least 16 per cent. on a length of 8 inches before fracture.

Strips cut from the plate, angle or bulb steel to be heated to a low cherry-red, and cooled in water of 82° Fahrenheit, must stand bending double round a curve of which the diameter is not more than three times the thickness of the plates tested.

In addition to this, occasional angle bars should be subjected to a cold test by having pieces cut off and bent flat and then doubled backwards.

## RIVETS.

The steel used for rivets to be of special quality, soft and ductile, and samples of the rivets should be tested by being bent both hot and cold, by flattening down the heads, and by occasional forge tests, in order to satisfy the Surveyors of their thorough efficiency.

MEM.—No reduction will be allowed in the sizes of rivets from those which would be required by the Rules for the vessels if built of iron.

In other respects the rules for the construction of iron ships will apply equally to ships built of steel.

By order of the Committee, BERNARD WAYMOUTH, *Secretary.*

*No. 2, White Lion Court, Cornhill, London, E.C.*
*19th May*, 1881, *and 28th May*, 1885.

* Steel angles intended for the framing of vessels, and bulb steel for beams, may have a maximum tensile strength of 33 tons per square inch of section, provided they be capable of withstanding the bending tests, and of being efficiently welded.

NOTICE, No. 552. (*See* NOTICE, No. 436*.)

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## SHIPS BUILT OF STEEL.

NOTICE is hereby given that the Committee of this Society have this day passed the following Resolutions in regard to vessels built of steel :—

1. In vessels whose plating number does not exceed 8,000, the buttstraps of the sheerstrake, deck stringer plate, and one strake at the bilges for half the vessel's length amidships are to be $\frac{1}{20}$th of an inch thicker than the plates they connect, and to be double riveted.

2. When the plating number is above 8,000 and not exceeding 13,000, the buttstraps of the sheerstrake, deck stringer plate, and two strakes round the bilges are to be $\frac{2}{20}$ths of an inch thicker than the plates they connect, for half the vessel's length amidships, and treble riveted.

3. When the plating number is over 13,000 and not exceeding 16,000, an additional strake of bilge plating is to be treble riveted at the butts for half the length amidships with straps $\frac{2}{20}$ths of an inch thicker than the plates they connect.

4. When the plating number is over 16,000 and not exceeding 20,000, in addition to the foregoing, the butts of the outside strakes of plating are to be treble riveted with straps $\frac{2}{20}$ths of an inch thicker than the plates they connect, for half the vessel's length amidships.

5. When the plating number is above 20,000 and not exceeding 24,000, all the butts are to be treble riveted for half the vessel's length amidships with straps $\frac{3}{20}$ths of an inch thicker than the plates they connect; and the remaining buttstraps to be $\frac{2}{20}$ths of an inch thicker than the plates. In addition the butts of the upper deck stringer plate are to have double straps for half the length amidships.

6. When the plating number is above 24,000 and not exceeding 28,000, all the buttstraps are to be treble riveted for three-fourths the length amidships, and the outer or back row of rivets is to be made complete. The buttstraps for half the length amidships to be $\frac{4}{20}$ths of an inch thicker than the plates; and the remaining buttstraps $\frac{2}{20}$ths of an inch thicker than the plates.

7. When the plating number is above 28,000, the whole of the buttstraps fore and aft are to be treble riveted with the back row of rivets complete, and to be $\frac{4}{20}$ths of an inch thicker than the plates they connect. It is recommended that in vessels of this size and exceeding 12 depths in length, double buttstraps be fitted to the sheerstrake and topside plating, or other equivalent strength supplied to the sstisfaction of the Committee.

8. The rivets in the butts of outside plating and deck stringer plate to be spaced not more than $3\frac{1}{2}$ diameters apart from centre to centre.

9. In order to give a more uniform effect to the 20 per cent. reduction allowed for steel by Circular No. 436*, it has been determined that the measurements for steel may be made in 20ths of an inch, instead of 32nds, as has hitherto been the practice; the percentage reduction to be subject to such modifications as may be deemed necessary by the Committee, according to the size of the vessel, when plans, &c., are submitted for their approval.

No. 552 (*continued*).

10. The following Table indicates the thicknesses allowed for steel scantlings, compared with those required for Iron Ships as set forth in Table G 1, &c. :—

| Thickness in Iron. | | Thickness in Steel with 20 per cent. reduction. | Thickness in Iron. | | Thickness in Steel with 20 per cent. reduction. |
|---|---|---|---|---|---|
| $\frac{16}{16}$ | : | $\frac{16}{20}$ | $\frac{10}{16}$ | : | $\frac{10}{20}$ |
| $\frac{15}{16}$ | : | $\frac{15}{20}$ | $\frac{9}{16}$ | : | $\frac{9}{20}$ |
| $\frac{14}{16}$ | : | $\frac{14}{20}$ | $\frac{8}{16}$ | : | $\frac{8}{20}$ |
| $\frac{13}{16}$ | : | $\frac{13}{20}$ | $\frac{7}{16}$ | : | $\frac{7}{20}$ |
| $\frac{12}{16}$ | : | $\frac{12}{20}$ | $\frac{6}{16}$ | : | $\frac{6}{20}$ |
| $\frac{11}{16}$ | : | $\frac{11}{20}$ | | | |

11. It is to be understood that the general reduction of 20 per cent. allowed by Circular No. 436* for Steel Scantlings, is not to apply to the plating of long deck erections.

12. The stringer plates, sheerstrakes, garboard strakes, and all buttstraps when above $\frac{8}{16}$ths in thickness, are to be carefully annealed or the holes sufficiently rimed after punching, to remove the injurious effect of the punching.

13. The Surveyors should be careful to ensure that the black oxide or "mill-scale" is completely removed from the surfaces previous to painting, which should be delayed as long as possible.

By order of the Committee,

BERNARD WAYMOUTH,
*Secretary.*

*No. 2, White Lion Court, Cornhill, London, E.C.*
*28th May*, 1885.

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# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

NOTICE, No. 438.*

## BOILERS MADE OF STEEL.

NOTICE is hereby given, that the Committee of this Society have this day passed the following resolutions amending Notice No. 397 in regard to boilers made of steel :—

1. The use of steel will be sanctioned in the construction of boilers intended for vessels classed or proposed for classification in the Society's Register Book, provided the boilers be constructed in accordance with the requirements of the Rules, and the following conditions be fulfilled.

2. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

No. 438* (*continued.*)

length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82° Fahrenheit.

Steel rivets are to be considered as part of the material, and in addition to being subjected to a shearing test, they must be capable of withstanding the same tests as the platess are required to undergo.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented.* In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers.

4. The Society's Surveyor will attend at the steel works when necessary, and select the samples for testing before the plates are sheared to size, and these samples when marked by him for testing should, as far as practicable, be followed by the Surveyor through the different stages of preparation until the tests are completed.

5. The Society's Surveyor will require to have every facility placed in his way for tracing all plates to their respective charges, and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the tests applied to the material, is to be signed and forwarded to the boiler manufacturer, and the other is to be retained by himself.

6. The samples are taken for testing in order that the general quality of the material may be ascertained, and if any sample should fail to fulfil the conditions laid down, the plate from which the sample is taken must be rejected; and further tests should be made before any material, made from the same cast or charge as the failing sample, can be approved.

7. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.

8. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.

9. No steel stays are to be welded.

10. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

By order of the Committee,

BERNARD WAYMOUTH,

*Secretary.*

*No. 2, White Lion Court, Cornhill, London, E.C.*

19*th May*, 1881.

* When a great number of charges are represented in the number of plates submitted, a proportion of one tensile and one temper test to every ten plates will be deemed sufficient, provided they all prove to be satisfactory.

# EXTRACTS FROM THE RULES

OF THE LATE

# UNDERWRITERS' REGISTRY FOR IRON VESSELS (for 1884-85)

*(NOW UNITED WITH LLOYD'S REGISTER OF SHIPPING),*

## SHOWING THE CONDITIONS OF CLASSIFICATION, &c.

### REVISION OF CERTIFICATE OR SUSPENSION OF CLASS.

The certificate of class will remain good so long as the vessel, under periodical survey, is found worthy of it. In case of defects reported by the Surveyors not being made good, the class of the vessel will be revised or suspended by the Committee.

### REFERENCE IN CASE OF COMPLAINT.

Any dispute shall be referred to three Shipbuilders or Engineers, one to be chosen by the Shipowner, one to be chosen by this Committee, and a third to act as umpire, to be chosen by the other two.

### SURVEY FEES.

| | | | |
|---|---|---|---|
| For surveying vessels periodically to ascertain condition, first visit ... ... ... | £1 | 1 | 0 |
| For each succeeding visit, when more than one visit is necessary ... ... ... | 0 | 10 | 6 |

For special surveys special charges will be made, subject to the control of the Committee.

### PERIODICAL SURVEYS.

A thorough survey will be required once in every four years for vessels with an A1* or an **A1*** certificate; and once in every three years for vessels with an A1, **A1**, A, or an **A** certificate. When vessels are abroad at the time they become due for survey, they must be examined on their return to the United Kingdom. The Surveyors are at all times to have free access to examine vessels holding a class in this Registry.

Vessels due for Periodical Survey which leave the United Kingdom without being duly surveyed and passed by the Surveyors to this Registry will have their class suspended until such survey has been properly made. Notice of Suspension of Class will be given in the first Monthly Supplement issued after the sailing of the vessel.

Vessels remaining abroad for two years after they become due for Periodical Survey will have their Class suspended until they have been re-surveyed

## FIRST SURVEY.

The vessel to be placed in dry dock. (The bottom may be cleaned, but should not be recoated before survey.) While in dry dock the rudder, rudder pins and gudgeons, and the whole of the bottom outside, are to be thoroughly examined, and in steamers the connections of the sea-cocks and openings in the bottom are to be examined, to see that they are in an efficient condition.

The holds, and, in steamers, the bunkers also, are to be cleared, the loose ceiling in the flat of bottom is to be lifted, and the Surveyor is to satisfy himself that the bottom inside is in good order, and that the cement is in good condition and satisfactorily adhering to the iron.

He is also to examine the decks, beam ends, and the sides of holds and 'tween decks, all fore and aft. In steamers the bilges and limbers under engines and boilers are to be cleaned out, so as to allow these parts to be examined by the Surveyor. In water-ballast steamers the tanks are to be examined externally, and, if the Surveyor deems it necessary, they are to be tested under the pressure due to the ballast-trim water-line, and sufficient ceiling removed to enable the Surveyor to satisfy himself of their tightness. In all cases the tanks are to be emptied, and examined inside. In all vessels any repairs that may be needed are to be done, and the vessel cleaned and painted as may be necessary.

## SECOND SURVEY.

The vessel to be submitted to the same survey as before described for "First Survey," with the following additions:—

A strake of ceiling must be lifted in the bilges to allow an examination of the condition of the iron surfaces there and of the cement.

The windlass must be unhung when the main piece is of wood; and the chain cables must be ranged out for examination. In steamers the water ballast tanks must be tested under the pressure due to ballast-trim water line

## THIRD SURVEY.

The vessel to be submitted to the same survey as before described for "First Survey," with the following additions:—

The whole of the close ceiling must be removed, and all the cement exposed and examined. The vessel must be cleaned and scaled, and, if the Surveyor deems it necessary, the plating and other parts must be drilled as he may direct, to ascertain the thickness. In steamers the water ballast tanks must be tested under the pressure due to ballast-trim water line.

## FOURTH SURVEY.

The vessel to be submitted to the same survey as before described for "First Survey," with the following additions:—

The windlass, if the main piece is of wood, must be unhung, and the chain cables ranged out for examination. In steamers the water ballast tanks must be tested under the pressure due to the ballast-trim water line.

## FIFTH SURVEY.

The vessel must be submitted to the same survey as before described for "Second Survey."

## SIXTH SURVEY OR SPECIAL SURVEY.

The vessel must be submitted to the same survey as before described for "Third Survey," with the following additions :—

The actual condition and thickness of all the scantlings must be ascertained, the shell plating being drilled on at least three vertical lines in each strake, viz., forward, amidships, and aft, and elsewhere, at the discretion of the Surveyor, as he may direct.

A report of the vessel's condition and scantlings is to be submitted to the Committee, and such part or parts as they may direct are to be renewed, or otherwise strengthened.

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After a vessel has passed her sixth survey, and been approved by the Committee, she must be submitted to the same series of surveys, commencing with the "First Survey," and at the same periodical intervals as before.

In steamers, whenever the engines or boilers are removed, a survey is to be held on the vessel's bottom in way thereof, and such repairs as are necessary must be effected before the engines or boilers are replaced.

The preceding rules for periodical surveys are not to limit the Surveyor's discretion, if, in his judgment, it is necessary to make a more complete examination at any time; and, before completing his report, the Surveyor must, at every periodical survey, satisfy himself that the vessel and her equipment are in a good and efficient condition.

The "Third Survey" must be complied with before the expiration of thirteen years from the date of launch for vessels with an A1* or **A1*** certificate, ten years for vessels with an A1 or **A1** certificate, and nine years for vessels with an A or **A** certificate; and the "Sixth Survey" before the expiration of twenty-six years from the date of launch for vessels with an A1* or **A1*** certificate, twenty years for vessels with an A1 or **A1** certificate, and eighteen years for vessels with an A or **A** certificate.

The symbols of class when printed within brackets thus (**A1***) — indicate that the class of the Vessel has lapsed for want of Survey, and when printed within brackets thus (**A1***) (—), that the class has been withdrawn by request of the Owners.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,
2, WHITE LION COURT, CORNHILL, E.C.
1*st September*, 1885.

# IRON VESSELS.

## TABLE G. 1.

### TABLE OF MINIMUM DIMENSIONS OF KEELS, STEMS, STERN POSTS, FRAMES, REVERSED FRAMES, FLOOR PLATES, BULKHEADS, OUTSIDE PLATING, PILLARS, &c.

| NUMBERS. For Frames, Reversed Frames, Bulkheads, and Pillars. | SPACING OF FRAMES. | FRAMES FOR ALL GRADES. Dimensions of angle iron for three-fifths the length of vessel amidships, and bulkheads. | FRAMES FOR ALL GRADES. Dimensions of angle iron before and abaft the three-fifths length. | Dimensions of angle iron for Reversed frames for all grades. | Bulkheads. | Diameter of solid pillars to beams. Hold. | Diameter of solid pillars to beams. Deck. |
|---|---|---|---|---|---|---|---|
| | | inches. | inches. | inches. | inches. | inches. | inches. |
| 31·5 and under 37 | In Vessels where the numbers in Table G 1 are under 5200, the space of the frames from centre to centre is not to exceed 20 inches; where they are 5200, and under 8900, the space may be 21 inches; where the numbers are 8900 and under 13100, the space may be 22 inches; when 13100, and under 16600, the space may be 23 inches; when 16600, and under 48500, it may be 24 inches; and when 48500 and above, it may be 26 inches. | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | $2\frac{1}{4}\times2\frac{1}{4}\times\frac{4}{16}$ | $\frac{4}{16}$ | — | $2\frac{1}{4}$ |
| 37 and under 45 | | $3\times2\frac{1}{2}\times\frac{5}{16}$ | $3\times2\frac{1}{2}\times\frac{5}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{4}{16}$ | $\frac{4}{16}$ | — | $2\frac{1}{2}$ |
| 45 and under 52 | | $3\times3\times\frac{6}{16}$ | $3\times3\times\frac{5}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | $\frac{4}{16}$ | $2\frac{1}{2}$ | $2\frac{3}{8}$ |
| 52 and under 57 | | $3\frac{1}{2}\times3\times\frac{6}{16}$ | $3\frac{1}{2}\times3\times\frac{5}{16}$ | $3\times2\frac{1}{2}\times\frac{5}{16}$ | $\frac{5}{16}$ | $2\frac{5}{8}$ | $2\frac{3}{8}$ |
| 57 and under 61 | | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $3\frac{1}{2}\times3\times\frac{6}{16}$ | $3\times2\frac{1}{2}\times\frac{6}{16}$ | $\frac{5}{16}$ | $2\frac{3}{4}$ | $2\frac{1}{2}$ |
| 61 and under 65 | | $4\times3\times\frac{7}{16}$ | $4\times3\times\frac{6}{16}$ | $3\times3\times\frac{6}{16}$ | $\frac{6}{16}$ | $2\frac{7}{8}$ | $2\frac{1}{2}$ |
| 65 and under 68 | | $4\times3\times\frac{7}{16}$ | $4\times3\times\frac{6}{16}$ | $3\times3\times\frac{6}{16}$ | $\frac{6}{16}$ | 3 | $2\frac{1}{2}$ |
| 68 and under 71 | | $4\frac{1}{2}\times3\times\frac{7}{16}$ | $4\frac{1}{2}\times3\times\frac{6}{16}$ | $3\times3\times\frac{7}{16}$ | $\frac{6}{16}$ | $3\frac{1}{8}$ | $2\frac{5}{8}$ |
| 71 and under 73 | | $4\frac{1}{2}\times3\times\frac{8}{16}$ | $4\frac{1}{2}\times3\times\frac{7}{16}$ | $3\times3\times\frac{7}{16}$ | $\frac{6}{16}$ | $3\frac{1}{4}$ | $2\frac{5}{8}$ |
| 73 and under 76 | | $5\times3\times\frac{8}{16}$ | $5\times3\times\frac{7}{16}$ | $3\times3\times\frac{7}{16}$ | $\frac{6}{16}$ | $3\frac{3}{8}$ | $2\frac{5}{8}$ |
| 76 and under 80 | | $5\times3\times\frac{8}{16}$ | $5\times3\times\frac{7}{16}$ | $3\frac{1}{2}\times3\times\frac{8}{16}$ | $\frac{7}{16}$ | $3\frac{1}{2}$ | $2\frac{3}{4}$ |
| 80 and under 85 | | $5\times3\frac{1}{2}\times\frac{8}{16}$ | $5\times3\frac{1}{2}\times\frac{7}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $\frac{7}{16}$ | $3\frac{5}{8}$ | $2\frac{3}{4}$ |
| 85 and under 92 | | $5\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $5\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $\frac{7}{16}$ | $3\frac{5}{8}$ | $2\frac{3}{4}$ |
| 92 and under 99 | | $5\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$ | $5\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $4\times3\frac{1}{2}\times\frac{8}{16}$ | $\frac{7}{16}$ | $3\frac{3}{4}$ | $2\frac{7}{8}$ |
| 99 and under 104 | | $6\times3\frac{1}{2}\times\frac{9}{16}$ | $6\times3\frac{1}{2}\times\frac{8}{16}$ | $4\times3\frac{1}{2}\times\frac{9}{16}$ | $\frac{7}{16}$ | $3\frac{3}{4}$ | $2\frac{7}{8}$ |
| 104 and under 110 | | $6\times3\frac{1}{2}\times\frac{10}{16}$ | $6\times3\frac{1}{2}\times\frac{9}{16}$ | $4\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$ | $\frac{7}{16}$ | 4 | 3 |
| 110 and under 115 | | $6\frac{1}{2}\times3\frac{1}{2}\times\frac{10}{16}$ | $6\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$ | $4\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$ | $\frac{7}{16}$ | $4\frac{1}{4}$ | 3 |
| 115 and under 120 | | $7\times3\frac{1}{2}\times\frac{10}{16}$ | $6\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$ | $4\frac{1}{2}\times4\times\frac{9}{16}$ | $\frac{7}{16}$ | $4\frac{1}{2}$ | $3\frac{1}{4}$ |

| NUMBERS. For Keel, Stem, Sternpost, and Plating. | KEEL. FOR ALL GRADES. | Stem of Sailing vessels and Steamers, and Sternpost of Sailing vessels and Paddle Steamers. | Stern-frame of Screw Steamers. | THICKNESS OF OUTSIDE PLATING FOR HALF-LENGTH AMIDSHIPS. Garboard Strakes. 100A | Garboard Strakes. 90A AND 80A | From Garboard to the lower edge of sheerstrake. (a) 100A | From Garboard to the lower edge of sheerstrake. (a) 90A | From Garboard to the lower edge of sheerstrake. (a) 80A | Sheerstrake for all grades. | From main to upper sheerstrakes in Spar decked vessels. — all grades. |
|---|---|---|---|---|---|---|---|---|---|---|
| | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches |
| 2600 and under 3400 | $6\times1\frac{1}{8}$ | $5\frac{1}{2}\times1\frac{1}{8}$ | $5\frac{1}{2}\times2\frac{1}{4}$ | $30\times\frac{6}{16}$ | $\frac{6}{16}$ | $\frac{5}{16}$ & $\frac{6}{16}$ | $\frac{5}{16}$ | $\frac{4}{16}$ & $\frac{5}{16}$ | $30\times\frac{6}{16}$ | |
| 3400 and under 5200 | $6\frac{3}{4}\times1\frac{1}{4}$ | $6\times1\frac{1}{4}$ | $6\times2\frac{1}{2}$ | $\times\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | $\frac{5}{16}$ & $\frac{6}{16}$ | $\frac{5}{16}$ | $\times\frac{7}{16}$ | |
| 5200 and under 7200 | $7\times1\frac{5}{8}$ | $6\frac{1}{4}\times1\frac{5}{8}$ | $6\frac{1}{4}\times3\frac{1}{4}$ | $\times\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ & $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{5}{16}$ & $\frac{6}{16}$ | $\times\frac{8}{16}$ | |
| 7200 and under 8900 | $7\frac{1}{4}\times1\frac{7}{8}$ | $6\frac{1}{2}\times1\frac{7}{8}$ | $6\frac{1}{2}\times3\frac{3}{4}$ | $\times\frac{9}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ & $\frac{7}{16}$ | $\frac{6}{16}$ | $33\times\frac{9}{16}$ | |
| 8900 and under 10450 | $7\frac{1}{2}\times2\frac{1}{8}$ | $6\frac{3}{4}\times2\frac{1}{8}$ | $6\frac{3}{4}\times4\frac{1}{4}$ | $32\times\frac{9}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ & $\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ & $\frac{7}{16}$ | $\times\frac{10}{16}$ | |
| 10450 and under 11800 | $7\frac{1}{2}\times2\frac{1}{4}$ | $7\times2\frac{1}{4}$ | $7\times4\frac{1}{2}$ | $\times\frac{9}{16}$ | $\frac{8}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ & $\frac{8}{16}$ | $\frac{7}{16}$ | $\times\frac{10}{16}$ | |
| 11800 and under 13100 | $8\times2\frac{3}{8}$ | $7\times2\frac{3}{8}$ | $7\times4\frac{3}{4}$ | $\times\frac{10}{16}$ | $\frac{9}{16}$ | $\frac{8}{16}$ & $\frac{9}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ & $\frac{8}{16}$ | $36\times\frac{10}{16}$ | |
| 13100 and under 14300 | $8\times2\frac{3}{8}$ | $7\frac{1}{4}\times2\frac{3}{8}$ | $7\frac{1}{4}\times4\frac{3}{4}$ | $34\times\frac{10}{16}$ | $\frac{9}{16}$ | $\frac{9}{16}$ | $\frac{8}{16}$ & $\frac{9}{16}$ | $\frac{8}{16}$ | $\times\frac{11}{16}$ | $\frac{7}{16}$ |
| 14300 and under 15500 | $8\times2\frac{3}{8}$ | $7\frac{1}{2}\times2\frac{3}{8}$ | $7\frac{1}{2}\times4\frac{3}{4}$ | $\times\frac{11}{16}$ | $\frac{10}{16}$ | $\frac{9}{16}$ & $\frac{10}{16}$ | $\frac{9}{16}$ | $\frac{8}{16}$ & $\frac{9}{16}$ | $\times\frac{11}{16}$ | $\frac{7}{16}$ |
| 15500 and under 16600 | $8\frac{1}{2}\times2\frac{1}{2}$ | $8\times2\frac{1}{2}$ | $8\times5$ | $\times\frac{11}{16}$ | $\frac{10}{16}$ | $\frac{9}{16}$ & $\frac{10}{16}$ | $\frac{9}{16}$ | $\frac{8}{16}$ & $\frac{9}{16}$ | $\times\frac{12}{16}$ | $\frac{7}{16}$ |
| 16600 and under 18700 | $9\times2\frac{1}{2}$ | $8\frac{1}{2}\times2\frac{1}{2}$ | $8\frac{1}{2}\times5$ | $36\times\frac{11}{16}$ | $\frac{10}{16}$ | $\frac{10}{16}$ | $\frac{9}{16}$ & $\frac{10}{16}$ | $\frac{9}{16}$ | $40\times\frac{12}{16}$ | $\frac{8}{16}$ |
| 18700 and under 21700 | $9\frac{1}{2}\times2\frac{1}{2}$ | $9\times2\frac{1}{2}$ | $9\times5\frac{1}{2}$ | $\times\frac{12}{16}$ | $\frac{11}{16}$ | $\frac{10}{16}$ & $\frac{11}{16}$ | $\frac{10}{16}$ | $\frac{9}{16}$ & $\frac{10}{16}$ | $\times\frac{13}{16}$ | $\frac{8}{16}$ |
| 21700 and under 26400 | $10\times2\frac{3}{4}$ | $10\times2\frac{3}{4}$ | $10\times6$ | $\times\frac{12}{16}$ | $\frac{11}{16}$ | $\frac{11}{16}$ | — | — | $\times\frac{13}{16}$ | $\frac{8}{16}$ |
| 26400 and under 30900 | $11\times2\frac{3}{4}$ | $11\times2\frac{3}{4}$ | $11\times6\frac{1}{2}$ | $\times\frac{12}{16}$ | $\frac{12}{16}$ | $\frac{11}{16}$ & $\frac{12}{16}$ | — | — | $\times\frac{13}{16}$ | $\frac{8}{16}$ |
| 30900 and under 35200 | $11\times3$ | $11\times3$ | $11\times7$ | $\times\frac{13}{16}$ | $\frac{12}{16}$ | $\frac{12}{16}$ | — | — | $\times\frac{13}{16}$ | $\frac{9}{16}$ |
| 35200 and under 40000 | $11\times3\frac{1}{4}$ | $11\times3\frac{1}{4}$ | $11\times7\frac{1}{2}$ | $\times\frac{14}{16}$ | $\frac{12}{16}$ | $\frac{12}{16}$ & $\frac{13}{16}$ | — | — | $\times\frac{14}{16}$ | $\frac{9}{16}$ |
| 40000 and under 48500 | $12\times3\frac{1}{4}$ | $12\times3\frac{1}{4}$ | $12\times8$ | $\times\frac{14}{16}$ | — | $\frac{13}{16}$ | — | — | $\times\frac{14}{16}$ | $\frac{9}{16}$ |
| 48500 and under 56000 | $12\times3\frac{1}{2}$ | $12\times3\frac{1}{2}$ | $13\times8\frac{1}{2}$ | $\times\frac{15}{16}$ | — | $\frac{13}{16}$ & $\frac{14}{16}$ | — | — | $\times\frac{15}{16}$ | $\frac{9}{16}$ |
| 56000 and under 67000 | $12\times3\frac{3}{4}$ | $12\times3\frac{3}{4}$ | $13\times9$ | $\times\frac{15}{16}$ | — | $\frac{14}{16}$ | — | — | $\times\frac{16}{16}$ | $\frac{9}{16}$ |

(a) In the columns for plating, where two thicknesses are given, they are to be worked in alternate strakes, and the large thickness is to apply to the outer strakes, and the smaller one to the inner strakes: and the size of the rivets and double riveting to be regulated by the thickness of the thicker plating, except where $\frac{9}{16}$ and $\frac{10}{16}$ outside plating is used alternately, when $\frac{3}{4}$ of an inch rivets may be used.

## TABLE FOR SIZES OF FLOORS. *See* Section 7.

Floor plates under *Engines and Boilers* of Steam Vessels to be one-sixteenth of an inch thicker than given in this Table, where the plates are nine-sixteenths of an inch and under.

| NUMBERS FOR FLOORS. | 31 and under 32 | 32 to 33 | 33 to 34 | 34 to 35 | 35 to 37 | 37 to 39 | 39 to 41 | 41 to 43 | 43 to 45 | 45 to 47 | 47 to 49 | 49 to 51 | 51 to 52 | 52 to 53 | 53 to 55 | 55 to 56 | 56 to 57 | 57 to 58 | 58 to 59 | 59 to 60 | 60 to 62 | 62 to 63 | 63 to 64 | 64 to 65 | 65 to 66 | 66 to 67 | 67 to 68 | 68 to 69 | 69 to 70 | 70 to 71 | 71 to 72 | 72 to 73 | 73 to 74 | 74 to 76 | 76 to 78 | 78 to 80 | 80 to 84 | 84 to 88 | 88 to 92 | 92 to 98 | 98 to 105 | 105 to 110 | 110 to 115 | 115 to 120 | 120 to 126 | NUMBERS FOR FLOORS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sizes. | 9 × $\frac{4}{16}$ | $9\frac{1}{2}$ × $\frac{4}{16}$ | 10 × $\frac{4}{16}$ | $10\frac{1}{2}$ × $\frac{4}{16}$ | 11 × $\frac{5}{16}$ | $11\frac{1}{2}$ × $\frac{5}{16}$ | 12 × $\frac{5}{16}$ | 12 × $\frac{6}{16}$ | $12\frac{1}{2}$ × $\frac{6}{16}$ | 13 × $\frac{6}{16}$ | $13\frac{1}{2}$ × $\frac{6}{16}$ | 14 × $\frac{6}{16}$ | $14\frac{1}{2}$ × $\frac{6}{16}$ | 15 × $\frac{6}{16}$ | $15\frac{1}{2}$ × $\frac{6}{16}$ | $15\frac{1}{2}$ × $\frac{7}{16}$ | 16 × $\frac{7}{16}$ | $16\frac{1}{2}$ × $\frac{7}{16}$ | 17 × $\frac{7}{16}$ | $17\frac{1}{2}$ × $\frac{7}{16}$ | $17\frac{1}{2}$ × $\frac{8}{16}$ | 18 × $\frac{8}{16}$ | $18\frac{1}{2}$ × $\frac{8}{16}$ | 19 × $\frac{8}{16}$ | $19\frac{1}{2}$ × $\frac{8}{16}$ | 20 × $\frac{8}{16}$ | $20\frac{1}{2}$ × $\frac{8}{16}$ | 21 × $\frac{8}{16}$ | 21 × $\frac{9}{16}$ | $21\frac{1}{2}$ × $\frac{9}{16}$ | 22 × $\frac{9}{16}$ | $22\frac{1}{2}$ × $\frac{9}{16}$ | 23 × $\frac{9}{16}$ | $23\frac{1}{2}$ × $\frac{9}{16}$ | 24 × $\frac{9}{16}$ | 24 × $\frac{10}{16}$ | $24\frac{1}{2}$ × $\frac{10}{16}$ | 25 × $\frac{10}{16}$ | 26 × $\frac{10}{16}$ | 28 × $\frac{10}{16}$ | 30 × $\frac{10}{16}$ | 32 × $\frac{10}{16}$ | 34 × $\frac{10}{16}$ | 36 × $\frac{10}{16}$ | 38 × $\frac{10}{16}$ | Sizes. |

Mem.—The Scantlings given in the above Table are intended for Vessels, the length of which does not exceed *eleven times* their depth *from top of keel, see Section* 1. For Vessels which exceed this proportion, *see Section* 46. For proportions of breadth to length, *see Table G.* 4.

Lloyd's Register of Shipping,
2, White Lion Court, Cornhill, London, *28th May*, 1885.

# IRON VESSELS.

## TABLE G. 2.

### TABLE OF MINIMUM DIMENSIONS OF KEELSONS, KEELSON AND STRINGER ANGLE IRONS, DECKS, RUDDERS, CEILING, AND WINDLASSES.

| NUMBERS. To regulate keelsons stringers, decks, rudders, ceiling, and windlasses. | Size of middle-line keelsons standing upon floors, and thickness of rider plate to keelson for all grades. | Thickness of intercostal keelson plates and side plates for box keelsons, for all grades. (aa) | Dimensions of angle irons on upper deck beam stringer plates in one and two-decked vessels, also for keelsons, and stringers in hold, for all grades. | Dimensions of angle irons on the middle, lower or hold, and orlop beam stringer plates, on upper deck stringer plates in three-decked, spar-decked, and awning-decked vessels, also for box keelsons, for all grades. | RUDDER. | | | | Thickness of upper deck, for all grades. | Thickness of wood ceiling in hold, to upper part of bilges. | WINDLASS. | | | | NUMBERS. To regulate keelsons, stringers, decks, rudders, ceiling, and windlasses. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sailing Vessels. | | Steam Vessels. | | | | Sailing Vessels. | | Steam Vessels. | | |
| | | | | | Diameter at the head. | Diameter at the heel & pintle. | Diameter at the head. | Diameter at the heel & pintle. | (a) Wood. | | Diameter of iron spindle. | Diameter of main piece. | Diameter of iron spindle. | Diameter of main piece. | |
| | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | |
| 2600 and under 3400 | $7\frac{1}{2} \times \frac{6}{16}$ | $\frac{4}{16}$ | $3 \times 3 \times \frac{6}{16}$ | $2\frac{3}{4} \times 2\frac{3}{4} \times \frac{6}{16}$ | $2\frac{7}{8}$ | 2 | 3 | 2 | $2\frac{1}{2}$ | 2 | $2\frac{1}{4}$ | $12\frac{1}{2}$ | 2 | 12 | 2600 and under 3400 |
| 3400 and under 5200 | $8\frac{1}{2} \times \frac{7}{16}$ | $\frac{5}{16}$ | $3 \times 3 \times \frac{6}{16}$ | $3 \times 3 \times \frac{6}{16}$ | 3 | 2 | $3\frac{1}{2}$ | 2 | 3 | 2 | $2\frac{1}{2}$ | 14 | $2\frac{1}{4}$ | 13 | 3400 and under 5200 |
| 5200 and under 7200 | $10 \times \frac{8}{16}$ | $\frac{5}{16}$ | $3 \times 3 \times \frac{6}{16}$ | $3 \times 3 \times \frac{6}{16}$ | $3\frac{1}{2}$ | 2 | $3\frac{3}{4}$ | $2\frac{1}{4}$ | 3 | 2 | $2\frac{3}{4}$ | 15 | $2\frac{1}{2}$ | 14 | 5200 and under 7200 |
| 7200 and under 8900 | $11 \times \frac{9}{16}$ | $\frac{6}{16}$ | $3\frac{1}{2} \times 3 \times \frac{6}{16}$ | $3 \times 3 \times \frac{6}{16}$ | $3\frac{3}{4}$ | $2\frac{1}{4}$ | $4\frac{1}{4}$ | $2\frac{1}{2}$ | $3\frac{1}{2}$ | $2\frac{1}{2}$ | 3 | 16 | $2\frac{3}{4}$ | 15 | 7200 and under 8900 |
| 8900 and under 10450 | $12 \times \frac{9}{16}$ | $\frac{6}{16}$ | $4 \times 3 \times \frac{6}{16}$ | $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{6}{16}$ | $4\frac{1}{4}$ | $2\frac{1}{2}$ | $4\frac{1}{2}$ | $2\frac{3}{4}$ | $3\frac{1}{2}$ | $2\frac{1}{2}$ | $3\frac{1}{4}$ | 17 | $2\frac{3}{4}$ | 15 | 8900 and under 10450 |
| 10450 and under 11800 | $12 \times \frac{10}{16}$ | $\frac{7}{16}$ | $4\frac{1}{2} \times 3 \times \frac{7}{16}$ | $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$ | $4\frac{1}{2}$ | $2\frac{3}{4}$ | $4\frac{3}{4}$ | $2\frac{3}{4}$ | $3\frac{1}{2}$ | $2\frac{1}{2}$ | $3\frac{1}{2}$ | 18 | 3 | 16 | 10450 and under 11800 |
| 11800 and under 13100 | $13 \times \frac{10}{16}$ | $\frac{7}{16}$ | $4\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$ | $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$ | $4\frac{3}{4}$ | $2\frac{3}{4}$ | 5 | 3 | $3\frac{1}{2}$ | $2\frac{1}{2}$ | $3\frac{5}{8}$ | 19 | $3\frac{1}{4}$ | 17 | 11800 and under 13100 |
| 13100 and under 14300 | $14 \times \frac{11}{16}$ | $\frac{7}{16}$ | $5 \times 3\frac{1}{2} \times \frac{7}{16}$ | $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$ | 5 | 3 | $5\frac{1}{4}$ | 3 | $3\frac{1}{2}$ | $2\frac{1}{2}$ | $3\frac{3}{4}$ | 20 | $3\frac{1}{4}$ | 17 | 13100 and under 14300 |
| 14300 and under 15500 | $15 \times \frac{11}{16}$ | $\frac{7}{16}$ | $5 \times 3\frac{1}{2} \times \frac{8}{16}$ | $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$ | $5\frac{1}{4}$ | 3 | $5\frac{1}{2}$ | 3 | $3\frac{1}{2}$ | $2\frac{1}{2}$ | 4 | 21 | $3\frac{1}{2}$ | 18 | 14300 and under 15500 |
| 15500 and under 16600 | $16 \times \frac{12}{16}$ | $\frac{8}{16}$ | $5 \times 3\frac{1}{2} \times \frac{9}{16}$ | $4 \times 4 \times \frac{8}{16}$ | $5\frac{1}{2}$ | 3 | $5\frac{3}{4}$ | 3 | 4 | $2\frac{1}{2}$ | $4\frac{1}{4}$ | 22 | $3\frac{5}{8}$ | 19 | 15500 and under 16600 |
| 16600 and under 18700 | $17 \times \frac{12}{16}$ | $\frac{8}{16}$ | $5 \times 4 \times \frac{9}{16}$ | $4 \times 4 \times \frac{9}{16}$ | 6 | 3 | $6\frac{1}{4}$ | $3\frac{1}{4}$ | 4 | $2\frac{1}{2}$ | $4\frac{1}{2}$ | 23 | $3\frac{5}{8}$ | 19 | 16600 and under 18700 |
| 18700 and under 21700 | $18 \times \frac{13}{16}$ | $\frac{8}{16}$ | $5\frac{1}{2} \times 4 \times \frac{9}{16}$ | $4 \times 4 \times \frac{9}{16}$ | $6\frac{1}{4}$ | $3\frac{1}{4}$ | 7 | $3\frac{1}{2}$ | 4 | $2\frac{1}{2}$ | $4\frac{5}{8}$ | 24 | 4 | 21 | 18700 and under 21700 |
| 21700 and under 26400 | $19 \times \frac{13}{16}$ | $\frac{9}{16}$ | $6 \times 4 \times \frac{9}{16}$ | $4 \times 4 \times \frac{9}{16}$ | $6\frac{3}{4}$ | $3\frac{1}{2}$ | $7\frac{3}{4}$ | $3\frac{3}{4}$ | 4 | $2\frac{1}{2}$ | $4\frac{5}{8}$ | $25\frac{1}{2}$ | $4\frac{1}{2}$ | 23 | 21700 and under 26400 |
| 26400 and under 30900 | $21 \times \frac{14}{16}$ | $\frac{9}{16}$ | $6\frac{1}{2} \times 4 \times \frac{9}{16}$ | $4 \times 4 \times \frac{9}{16}$ | $7\frac{1}{2}$ | $3\frac{3}{4}$ | $8\frac{1}{2}$ | 4 | 4 | $2\frac{1}{2}$ | $4\frac{3}{4}$ | 27 | $4\frac{5}{8}$ | 24 | 26400 and under 30900 |
| 30900 and under 35200 | $23 \times \frac{14}{16}$ | $\frac{9}{16}$ | $6\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{16}$ | $4 \times 4 \times \frac{9}{16}$ | 8 | 4 | 9 | $4\frac{1}{2}$ | 4 | $2\frac{1}{2}$ | $4\frac{3}{4}$ | $28\frac{1}{2}$ | $4\frac{5}{8}$ | $25\frac{1}{2}$ | 30900 and under 35200 |
| 35200 and under 40000 | $26 \times \frac{14}{16}$ | $\frac{9}{16}$ | $6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$ | $4 \times 4 \times \frac{9}{16}$ | $8\frac{1}{2}$ | $4\frac{1}{2}$ | $9\frac{1}{2}$ | $4\frac{3}{4}$ | 4 | $2\frac{1}{2}$ | 5 | 30 | $4\frac{3}{4}$ | 27 | 35200 and under 40000 |
| 40000 and under 48500 | $28 \times \frac{14}{16}$ | $\frac{9}{16}$ | $6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$ | $4 \times 4 \times \frac{9}{16}$ | — | — | 10 | 5 | 4 | $2\frac{1}{2}$ | — | — | — | — | 40000 and under 48500 |
| 48500 and under 56000 | $30 \times \frac{15}{16}$ | $\frac{9}{16}$ | $6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$ | $4 \times 4 \times \frac{9}{16}$ | — | — | $10\frac{1}{2}$ | $5\frac{1}{4}$ | 4 | $2\frac{1}{2}$ | — | — | — | — | 48500 and under 56000 |
| 56000 and under 67000 | $32 \times \frac{15}{16}$ | $\frac{9}{16}$ | $6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$ | $4 \times 4 \times \frac{9}{16}$ | — | — | 11 | $5\frac{1}{2}$ | 4 | $2\frac{1}{2}$ | — | — | — | — | 56000 and under 67000 |

*(aa)* The top and bottom plates of box keelsons to be one-sixteenth of an inch more in thickness than the side plates.

MEM.—The Scantlings given in the above Table are intended for Vessels, the length of which does not exceed *eleven times* their depth *from top of keel, see Section* 1. *For Vessels which exceed this proportion, see Section* 46. *For proportions of breadth to length, see Table G.* 4.

*(a)* When the deck is of Teak, it may be one-sixth less in thickness. When of iron it is to be in thickness as per Table G. 4, but where an iron deck is substituted for a wood one, it is not to be less than $\frac{6}{16}$ ins.

DIAMETER OF NUT AND SCREW BOLTS FOR FASTENING FLAT OF DECK.

| | |
|---|---|
| 3 ins. and under $3\frac{1}{2}$ ins. ... ... ... ... | $\frac{1}{2}$ inch. |
| $3\frac{1}{2}$ ,, ,, 4 ,, ... ... ... ... | $\frac{9}{16}$ ,, |
| 4 inches ... ... ... ... ... ... ... ... | $\frac{5}{8}$ ,, |

LLOYD'S REGISTER OF SHIPPING,
2, *White Lion Court, Cornhill,*
*5th June,* 1884.

# IRON VESSELS. Beams. TABLE G 3.

| Length of Beam amidships. | Upper and Lower Deck Beams in one and two decked vessels, Main and Lower Deck Beams in three decked and spar-decked Vessels, and Beams of raised quarter decks. | | | | Upper Deck Beams in three-decked vessels. (a) | | | | Size of Spar-deck Beams (a) all fore and aft, and Forecastle Beams. | | Size of Awning Deck Beams and Full Poop Beams. | | Hold Beams (b) of Extra Strength. | | Angle Iron Beams, when Iron Decks are fitted in accordance with Section 23. | Length of Beam amidships. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Size of Beams amidships. | | Size of Beams less than three-fourths the length of the midship Beam. | | Size of Beams amidships. | | Size of Beams less than three-fourths the length of the midship Beam. | | | | | | | | | |
| | Bulb Iron. | Single Angle Irons. | Bulb Iron. | Dbl. Ang. Irons. | Bulb Iron. | Dbl. Ang. Irons. | Bulb Iron. | Dbl. Ang. Irons. | Bulb Iron. | Dbl. Ang. Irons | Bulb Iron. | Single Angle Iron Beams. | Plate or Bulb Iron. | Size of Angle Irons. | Single Angle Irons. | |
| Feet. | ins. ins. | ins. ins. ins. | ins. ins. | ins. ins. ins. | ins. ins. | ins. ins. ins. | ins. ins. | ins. ins. ins. | ins. ins. | ins. ins. ins. | ins. ins. | ins. ins. ins. | ins. ins. | ins. ins. ins. | ins. ins. ins. | Feet. |
| 16 | | $4\frac{1}{2}\times3\times\frac{6}{16}$ | | | | | | | | | | | | | | |
| 18 | | $5\times3\times\frac{7}{16}$ | | | | | | | | | | | | | | |
| 20 | $5\times\frac{5}{16}$ Sng. Ang. Irn. | Dbl. Angl. Irons. $2\times2\times\frac{5}{16}$ $5\frac{1}{2}\times3\times\frac{7}{16}$ | | | | | | | | | | | | | | |
| 22 | $5\frac{1}{2}\times\frac{5}{16}$ | $2\frac{1}{2}\times2\frac{1}{4}\times\frac{5}{16}$ | | | | | | | | | | $4\frac{1}{2}\times3\times\frac{6}{16}$ | | | $4\times2\frac{1}{2}\times\frac{6}{16}$ | 22 |
| 24 | $6\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | $5\frac{1}{2}\times\frac{5}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | | | | | | | | $5\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $5\times3\times\frac{6}{16}$ | 24 |
| 26 | $6\frac{1}{2}\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $6\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $6\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | | | $5\frac{1}{2}\times\frac{5}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | | $5\times3\times\frac{7}{16}$ | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{7}{16}$ | $5\times3\times\frac{7}{16}$ | 26 |
| 28 | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $3\times3\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $6\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $6\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | | $5\frac{1}{2}\times3\times\frac{7}{16}$ | $8\times\frac{8}{16}$ | $4\times3\times\frac{7}{16}$ | $5\frac{1}{2}\times3\times\frac{7}{16}$ | 28 |
| 30 | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $2\frac{3}{4}\times2\frac{3}{4}\times\frac{5}{16}$ | | $6\times3\times\frac{7}{16}$ | $8\frac{1}{2}\times\frac{8}{16}$ | $4\times3\times\frac{7}{16}$ | $5\frac{1}{2}\times3\times\frac{8}{16}$ | 30 |
| 32 | $8\times\frac{8}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $3\times3\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $3\times2\frac{3}{4}\times\frac{5}{16}$ | | $6\frac{1}{2}\times3\times\frac{8}{16}$ | $9\times\frac{9}{16}$ | $4\times3\frac{1}{2}\times\frac{8}{16}$ | $5\frac{1}{2}\times3\times\frac{8}{16}$ Bulb Angle. | 32 |
| 34 | $8\frac{1}{2}\times\frac{8}{16}$ | $3\times3\times\frac{7}{16}$ | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{7}{16}$ | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $6\times\frac{6}{16}$ | Dbl. Ang. Irons. $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $4\times4\times\frac{8}{16}$ | $6\times3\times\frac{8}{16}$ Bulb Angle. | 34 |
| 36 | $9\times\frac{9}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\times\frac{8}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\times\frac{8}{16}$ | $3\times3\times\frac{6}{16}$ | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $6\frac{1}{2}\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$ | $10\times\frac{10}{16}$ | $4\times4\times\frac{9}{16}$ | $6\frac{1}{2}\times3\times\frac{9}{16}$ Bulb Angle. | 36 |
| 38 | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $8\frac{1}{2}\times\frac{8}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $8\frac{1}{2}\times\frac{8}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\times\frac{8}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\times\frac{8}{16}$ | $3\times3\times\frac{6}{16}$ | $7\times\frac{7}{16}$ | $3\times2\frac{1}{2}\times\frac{6}{16}$ | $10\frac{1}{2}\times\frac{10}{16}$ | $4\frac{1}{2}\times4\times\frac{9}{16}$ | $7\frac{1}{2}\times3\times\frac{9}{16}$ Bulb Angle | 38 |
| 40 | $10\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\times\frac{9}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\frac{1}{2}\times\frac{8}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\frac{1}{2}\times\frac{8}{16}$ | $3\times3\times\frac{6}{16}$ | $7\frac{1}{2}\times\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $11\times\frac{11}{16}$ | $5\times4\times\frac{9}{16}$ | For beams 40ft. & above, bulb Plates to be used. | 40 |
| 42 | $10\frac{1}{2}\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $9\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\times\frac{8}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $8\times\frac{8}{16}$ | $3\times3\times\frac{6}{16}$ | $11\frac{1}{2}\times\frac{11}{16}$ | $5\times4\times\frac{9}{16}$ | | 42 |
| 44 | $11\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $8\frac{1}{2}\times\frac{8}{16}$ | $3\times3\times\frac{7}{16}$ | $12\times\frac{12}{16}$ | $5\frac{1}{2}\times4\times\frac{9}{16}$ | | 44 |
| 46 | $11\frac{1}{2}\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\times\frac{9}{16}$ | $3\frac{1}{2}\times3\times\frac{7}{16}$ | $12\times\frac{12}{16}$ | $6\times4\times\frac{9}{16}$ | | 46 |
| 48 | $12\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\frac{1}{2}\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\frac{1}{2}\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $9\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $13\times\frac{13}{16}$ | $6\times4\times\frac{10}{16}$ | | 48 |
| 50 | $12\times\frac{11}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$ | $11\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $11\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\frac{1}{2}\times\frac{10}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\frac{1}{2}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $10\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$ | $13\times\frac{13}{16}$ | $6\times4\times\frac{10}{16}$ | | 50 |

The size of all beams (with the exception of those of spar decks, awning decks, poops and forecastles), which are not less in length than three-fourths of the length of the midship beam to be of the size given above for beams amidships; those of less length may be of the size given above, excepting those at hatchways exceeding in length four spaces of frames, mast and windlass beams, and beams under deck houses and the heel of bowsprit, which must not be less in size than the midship beam.

Strong beams in the machinery space must in all cases have double angle irons on their upper and lower edges.

No reduction is admitted at the ends of vessels in the size of spar and awning deck beams, and beams of poops and forecastles from those given above.

*(a)* The beams at the ends of hatchways exceeding in length six spaces of frames, must be equal in size to those of the main deck.

*(b)* These beams are to be formed of either a plate with double angle irons on its upper and lower edges, or a bulb plate with double angle irons and a covering plate on its upper edge. The beam plates and angle irons are to be of the sizes given above, and the broad flanges of the angle irons are to be fitted horizontally; the covering plate is to be of the thickness given for the angle irons.

Semi-box beams may be adopted in lieu thereof, formed of bulb plate and single angle irons of the sizes given for ordinary beams, secured in the usual way to two consecutive frames, and plated over by plating five sixteenths of an inch in thickness.

*Lloyd's Register of Shipping,*
*London, 2nd June,* 1881.

*Lloyd's Register of S*
*2, White Lion C*

# TABLE G.

Table of Minimum Dimensions of Stringer ates, Iron Decks, and Tie Plates.

| PLATING NUMBERS OF VESSELS | 2000 to 3000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11000 | 12000 | 13000 | 14000 | 15000 | 16000 | 17000 | 18000 | 19000 | 20000 | 21000 | 22000 | 23000 | 24000 | 25000 | 27000 | 28000 | 29000 | 31000 | 32000 | 34000 | 35000 | 36000 | 38000 | 39000 | 40000 | 42000 | 44000 | 46000 | 48000 | 50000 | 52000 | 54000 | 57000 | 60000 | 64000 | 68000 | PLATING NUMBERS OF VESSELS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Under 10 Depths, or Under 7 Breadths in Length. | 20×7/16 | 20×9/16 | 23×9/16 | 26×9/16 | 28×9/16 | 28×7/16 | 30×7/16 | 32×7/16 | 32×9/16 | 34×9/16 | 36×9/16 | 36×5/16 | 40×5/16 | 42×5/16 | 42×1/2 | 44×11/16 | 46×11/16 | 48×11/16 | 50×11/16 | 52×11/16 | 54×11/16 | 56×11/16 | 56×11/16 Iron Deck | 58×11/16 Length, 7/16. | 60×11/16 | 62×11/16 Iron Deck, | 65×11/16 | 68×11/16 Iron | 70×11/16 Iron Deck, | 72×11/16 Deck, | 74×11/16 | 56×11/16 Upr. & | 57×11/16 Mdl. Decks, | 58×11/16 Up.& Md. | 59×11/16 Up.&Md Dks, | 60×11/16 | 62×11/16 Up.Dk.8-16ths | 64×11/16 Mdl.Dk.7-16 | 66×11/16 I. Up | 68×11/16 & Mid | 70×11/16 Decks | 72×11/16 | 71×11/16 I. Up Dk | 76×11/16 Mid. | 78×11/16 Dk. 7/16 | 80×11/16 Lup&md Dks 7/16 | Under 10 Depths, or Under 7 Breadths in Length. |
| 10 to 11 Depths, or 7 to 7½ Breadths. | 22×7/16 | 22×9/16 | 25×9/16 | 28×5/8 | 31×9/16 | 32×7/16 | 34×7/16 | 36×7/16 | 36×9/16 | 38×5/16 | 40×5/8 | 40×9/16 | 44×5/16 | 46×9/16 | 46×11/16 | 48×11/16 | 50×11/16 | 52×11/16 | 50×11/16 Iron | 52×11/16 Dec | 54×11/16 k, 1/2- | 56×11/16 Leng | 58×11/16 th, | 61×11/16 7/16. | 63×11/16 Iron Deck, | 65×11/16 7/16. | 68×11/16 | 70×11/16 Iron | 72×11/16 Deck, | 74×11/16 7/16. | 55×11/16 Upr. & | 56×11/16 ½ Mdl. D | 57×11/16 ecks, 7/16 | 58×11/16 Up.& Md. | 59×11/16 Dks. 7/16 | 60×11/16 Up.Dk.8-16ths | 62×11/16 Mdl.Dk.7/16 | 64×11/16 I. Up | 66×11/16 & Mid. | 68×11/16 Decks | 70×11/16 | 72×11/16 I. Up Dk | 74×11/16 7/16. Mid | 76×11/16 Dk 7/16 | 78×11/16 L.up&md | 80×11/16 dks. 7/16 | 10 to 11 Depths, or 7 to 7½ Breadths. |
| 11 to 12 Depths, or 7½ to 8 Breadths. | 24×7/16 | 25×9/16 | 28×9/16 | 31×9/16 | 34×9/16 | 36×7/16 | 38×7/16 | 40×7/16 | 40×9/16 | 42×5/16 | 44×5/16 | 44×9/16 | 48×5/16 | 50×5/16 | 50×1/2 | 48×11/16 Iron Dec | 50×11/16 k, half | 52×11/16 Length, | 54×11/16 half Length, | 56×11/16 | 58×11/16 | 60×11/16 Iron | 62×11/16 Deck, | 64×11/16 Deck, | 66×11/16 7/16. | 68×11/16 | 70×11/16 Iron | 72×11/16 Deck, | 74×11/16 7/16. | 54×11/16 Upr. & | 55×11/16 ½ Mdl. | 56×11/16 Dk. 7/16. | 57×11/16 Upr. & M | 58×11/16 d.Dks.7/16 | 59×11/16 Up.dk 7/16 | 60×11/16 MdDk 7/16 | 62×11/16 I. Up | 64×11/16 & Mid. | 66×11/16 Decks | 68×11/16 | 70×11/16 I. Up Dk | 72×11/16 7/16. Mid | 74×11/16 Dk. 7/16 | 76×11/16 Iron Up. | 78×11/16 and Mid. | 80×11/16 Dks. 7/16 | 11 to 12 Depths, or 7½ to 8 Breadths. |
| 12 to 13 Depths, or 8 to 8½ Breadths. | 24×9/16 | 25×7/16 | 28×7/16 | 31×7/16 | 34×7/16 | 36×9/16 | 38×7/16 | 40×5/16 | 40×5/16 | 42×5/16 | 44×5/16 | 44×5/16 | 48×9/16 | 48×11/16 | 50×11/16 Iron | 52×11/16 Deck, | 54×11/16 half Le | 56×11/16 ngth, 7/16. | 58×11/16 | 58×11/16 | 60×11/16 Iron | 62×11/16 Deck, | 64×11/16 Deck, | 66×11/16 9/16. | 68×11/16 Iron | 70×11/16 Deck, | 72×11/16 | 74×11/16 7/16. | 54×11/16 Upr. & | 55×11/16 ½ Mdl. | 56×11/16 Dks., 7/16. | 57×11/16 Up.& Md. | 58×11/16 l.Dks.7/16. | 59×11/16 Up.dk 7/16 | 60×11/16 Md.dk 7/16 | 61×11/16 I. | 63×11/16 Upper | 65×11/16 & Mid. | 67×11/16 Dks. 7/16 | 69×11/16 L.Up Dk | 71×11/16 7/16. Mid | 73×11/16 Dk. 7/16 | 75×11/16 Iron Up. | 77×11/16 and Mid. | 79×11/16 Mdl. Dks. 7/16 | 81×11/16 [UD10dk.M 9/16-16L/D7-16] | 12 to 13 Depths, or 8 to 8½ Breadths. |
| 13 to 14 Depths, or 8½ to 9 Breadths. | 27×9/16 | 28×7/16 | 31×7/16 | 34×7/16 | 37×7/16 | 40×5/16 | 42×5/16 | 44×5/16 | 44×5/16 | 46×9/16 | 48×9/16 | 48×11/16 | 50×11/16 Iron Deck | 52×11/16 Deck, half | 54×11/16 Length, | 55×11/16 th, 7/16. | 57×11/16 | 59×11/16 Iron | 60×11/16 | 61×11/16 Deck | 62×11/16 k, | 64×11/16 7/16. | 66×11/16 | 68×11/16 Iron | 70×11/16 Deck, | 72×11/16 7/16. | 74×11/16 | 53×11/16 Upr. & | 54×11/16 ½ Mdl. D | 55×11/16 ecks, 7/16. | 56×11/16 Up.& Md. | 57×11/16 l.Dks.7/16 | 58×11/16 Up.dk 7/16 | 59×11/16 Md.dk 7/16 | 60×11/16 I. Up | 61×11/16 & Mdl. | 63×11/16 Decks, | 65×11/16 7/16. | 67×11/16 L. Up Dk | 69×11/16 7/16. Mid. | 71×11/16 Dk. 7/16 | 73×11/16 Iron Up. | 75×11/16 and Mid. | 77×11/16 Dks., 7/16 | 79×11/16 l.ud7/16.md | 81×11/16 7/16 ld 7/16 | 13 to 14 Depths, or 8½ to 9 Breadths. |
| 14 to 15 Depths, or 9 to 9½ Breadths. | 30×9/16 | 31×7/16 | 31×9/16 | 34×5/16 | 37×5/16 | 40×9/16 | 42×5/16 | 44×5/16 | 44×1/2 | 44×11/16 | 47×11/16 Iron | 50×11/16 Deck, | 52×11/16 ½ Leng | 54×11/16 gth,7/16 | 56×11/16 | 58×11/16 Iron | 59×11/16 | 60×11/16 Deck | 61×11/16 ck, | 62×11/16 9/16. | 64×11/16 | 66×11/16 Iron | 68×11/16 Deck, | 70×11/16 7/16. | 72×11/16 | 52×11/16 Upr. & | 53×11/16 ½ Mdl. | 54×11/16 Dks., 7/16. | 55×11/16 Upr. & | 56×11/16 & Mdl. | 57×11/16 Dks. 7/16. | 58×11/16 Up.dk 7/16 | 59×11/16 Md.dk 7/16 | 60×11/16 Iron Up | 61×11/16 & Middl | 62×11/16 e Dks., | 64×11/16 7/16. | 66×11/16 l.Up Dk. | 68×11/16 7/16. Mid | 70×11/16 Dk. 7/16 | 72×11/16 Iron Up. | 74×11/16 and Mid. | 76×11/16 Dks., 7/16 | 78×11/16 L.U.D.11/16 | 80×11/16 MdDk 7/16 | 82×11/16 L. Dk. 7/16 | 14 to 15 Depths, or 9 to 9½ Breadths. |
| 15 to 16 Depths, or 9½ to 10 Breadths. | 33×9/16 | 34×7/16 | 34×7/16 | 38×5/16 | 40×5/16 | 44×9/16 | 46×9/16 | 48×9/16 Iron | 48×11/16 Deck, | 50×11/16 half Le | 52×11/16 ngth. | 54×11/16 7/16. | 56×11/16 | 57×11/16 Iron | 58×11/16 Iron | 59×11/16 Deck, | 60×11/16 | 61×11/16 7/16. | 62×11/16 Iron | 64×11/16 Deck, | 66×11/16 Deck, | 68×11/16 | 49×11/16 Upr. & | 50×11/16 ½ Mdl. D | 51×11/16 ecks, 7/16. | 52×11/16 Upper | 53×11/16 and Mid | 54×11/16 dle Deck | 54×11/16 s, 7/16. | 55×11/16 Upr. Dk. | 56×11/16 7/16.& Mdl | 57×11/16 Dk. 7/16. | 58×11/16 Iron Up | 60×11/16 per and | 61×11/16 Middle D | 62×11/16 ecks, 7/16. | 63×11/16 I. Up Dk | 65×11/16 7/16 Mid. | 67×11/16 Dk. 7/16 | 69×11/16 I. Up | 71×11/16 and Mid. | 73×11/16 Dks. 7/16 | 75×11/16 I.U.D.11/16 | 77×11/16 MdDk 7/16 | 79×11/16 L. Dk. 7/16 | 81×11/16 L.up&md | 83×11/16 12, l d 7/16 | 15 to 16 Depths, or 9½ to 10 Breadths. |
| 16 to 17 Depths, or 10 to 10½ Breadths. | — | — | — | — | — | — | — | 49×9/16 | 51×11/16 | 53×11/16 | 54×11/16 Iron | 56×11/16 Deck, | 57×11/16 7/16. | 58×11/16 | 59×11/16 | 60×11/16 | 61×11/16 | 62×11/16 Iron | 64×11/16 Deck, | 66×11/16 7/16. | 68×11/16 | 49×11/16 Upr. & | 50×11/16 ½ Mdl. D | 51×11/16 ecks, 7/16. | 52×11/16 Upper | 53×11/16 and Mid | 54×11/16 dle Deck | 55×11/16 s, 7/16. | 56×11/16 Upr. Dk. | 57×11/16 7/16.& Mdl | 58×11/16 Iron | 59×11/16 Upper | 60×11/16 and Mid | 61×11/16 dle Deck | 62×11/16 s, 7/16. | 63×11/16 I. Up Dk | 64×11/16 7/16. Mid. | 66×11/16 Dk. 7/16 | 68×11/16 I. Up | 70×11/16 and Mid. | 72×11/16 Decks, 7/16 | 74×11/16 I.U.D.11/16 | 76×11/16 MdDk 7/16 | 78×11/16 L. Dk. 7/16 | 80×11/16 L.U.D. & | 82×11/16 MdDk 7/16 | 84×11/16 L.Dk. 7/16 | 16 to 17 Depths, or 10 to 10½ Breadths. |
| Over 17 Depths, or Over 10½ Breadths. | — | — | — | — | — | — | — | — | — | 54×11/16 I | 56×11/16 r o n | 57×11/16 | 58×11/16 D e | 59×11/16 k, | 60×11/16 7/16. | 61×11/16 | 62×11/16 | 64×11/16 | 66×11/16 | 48×11/16 Upr. & | 49×11/16 ½ Mdl. | 50×11/16 Decks, | 51×11/16 7/16. | 52×11/16 Upper & | 53×11/16 Mdl. D | 54×11/16 ecks, 7/16. | 55×11/16 Upr. Dk | 56×11/16 7/16.& M | 57×11/16 dl.Dk. 7/16 | 58×11/16 Iron | 59×11/16 Upper | 60×11/16 and Mid | 61×11/16 dle Deck | 62×11/16 s, 7/16. | 63×11/16 I. Up Dk | 64×11/16 7/16. Mid. | 66×11/16 Dk. 7/16 | 68×11/16 I. Up | 70×11/16 and Mid. | 72×11/16 Decks, 7/16 | 74×11/16 I.U.D.11/16 | 76×11/16 MdDk 7/16 | 78×11/16 L. Dk. 7/16 | 80×11/16 L.U.D. & | 82×11/16 MdDk 7/16 | 84×11/16 L.Dk. 7/16 | Over 17 Depths, or Over 10½ Breadths. |
| Ends of Stringer Plates. | — | — | 15×5/16 | 17×5/16 | 19×5/16 | 19×9/16 | 20×5/16 | 22×5/16 | 22×7/16 | 23×7/16 | 24×7/16 | 24×5/8 | 26×5/16 | 28×5/16 | 28×5/16 | 29×5/16 | 30×5/16 | 31×5/16 | 32×5/16 | 33×5/16 | 35×5/16 | 36×5/16 | 36×7/16 | 37×5/16 | 38×5/16 | 40×5/16 | 41×5/16 | 42×5/16 | 43×5/16 | 44×5/16 | 45×5/16 | 45×5/16 | 46×5/16 | 47×5/16 | 48×5/16 | 49×5/16 | 50×5/16 | 51×5/16 | 52×5/16 | 53×5/16 | 54×5/16 | 55×5/16 | 56×5/16 | 57×5/16 | 58×5/16 | 60×5/16 | Ends of Main Stringer Plates. |
| Hold Beam Stringer Plates (extreme breadth) *Ends of ditto.* | — | — | — | — | — | 20×9/16 | 21×5/16 | 22×5/8 | 23×7/16 | 25×7/16 | 27×7/16 | 28×5/16 | 29×5/16 | 30×5/16 | 31×5/16 | 32×5/16 | 33×5/16 | 34×5/16 | 35×5/16 | 27×5/16 | 28×5/16 | 29×5/16 | 30×5/16 | 31×5/8 | 32×5/16 | 33×5/16 | 34×5/16 | 35×5/16 | 36×5/16 | 36×5/16 | 37×5/16 | 38×5/16 | 40×7/16 | 41×5/16 | 41×7/16 | 42×5/8 | 43×7/16 | 44×5/16 | 45×5/8 | 46×5/16 | 47×5/16 | 48×5/16 | 49×5/16 | 50×7/16 | 51×5/8 | 52×5/16 | Hold Beam Stringer Plates (extreme breadth) *Ends of ditto.* |
| | — | — | — | — | — | 16×9/16 | 16×5/16 | 17×5/16 | 18×5/16 | 19×5/16 | 21×5/8 | 22×7/16 | 23×7/16 | 24×7/16 | 24×5/8 | 25×5/8 | 26×5/16 | 26×5/16 | 27×5/16 | 28×5/16 | 29×5/16 | 30×5/8 | 31×5/8 | 32×5/8 | 33×5/16 | 33×5/16 | 34×5/8 | 35×5/8 | 36×5/16 | 36×5/16 | 37×5/8 | 38×5/16 | 40×7/16 | 41×5/8 | 41×7/16 | 42×5/8 | 43×5/16 | 44×5/16 | 45×5/8 | 46×5/16 | 47×5/8 | 48×5/16 | 49×5/16 | 50×7/16 | 51×5/8 | 52×5/16 | |
| Tie Plates on Beams, Fore-and-Aft, and Diagonal. | — | — | 7×5/16 | 7×5/16 | 7×5/8 | 8×7/16 | 8×5/16 | 9×7/16 | 9×5/16 | 10×5/16 | 10×5/16 | 10×5/16 | 11×5/16 | 12×5/16 | 12×1/2 | 13×1/2 | 13×1/2 | 13×1/2 | 14×1/2 | 14×1/2 | 15×1/2 | 15×1/2 | 15×1/2 | 16×1/2 | 16×1/2 | 17×1/2 | 17×1/2 | 18×1/2 | 18×1/2 | 19×1/2 | 19×1/2 | 20×1/2 | 20×1/2 | 21×1/2 | 21×1/2 | 22×1/2 | 23×1/2 | 24×1/2 | 25×1/2 | 26×1/2 | 27×1/2 | 28×1/2 | 29×1/2 | 30×1/2 | 31×1/2 | 32×1/2 | Tie Plates on Beams, Fore-and-Aft, and Diagonal. |

Dimensions of Main Stringer Plates, &c.

*The depths for proportions to be taken from upper side of keel to top of upper deck beams in one, two, and three deck ships, and to top of main deck in spar and awning deck vessels; and, in spar-decked vessels, one depth may be taken off the proportions, so that in a spar-decked vessel of twelve and under thirteen depths in length, the stringers, &c., may be of the sizes given in the above Table for vessels of eleven and under twelve depths in length; and so on.*

In *two decked vessels* the stringer plates indicated with regard to the vessel's proportions in the above Table are to be fitted to the upper deck beams.

In *three decked vessels* the stringer plates so indicated in the above Table are to be fitted to the upper deck beams, and the stringer and tie plates required for the middle deck beams are to be of the same width as those given in the Table, but they may be one-sixteenth of an inch less in thickness.

In *spar decked vessels* the stringer plates given in the above Table are to be fitted to the main deck beams; and the stringer plates required for the spar deck beams are to be the breadth of, and may be two-sixteenths of an inch less in thickness than the stringer plates given on the upper line of the Table for vessels of the same plating number, and may be reduced at their ends to seven-sixteenths of an inch thick and to the breadth given for the ends of the main deck stringer plate in the Table.

In *awning decked vessels* the stringer plates given in the above Table are to be fitted to the main deck beams, and the stringer plates required for the awning deck beams are to be of the same width as those given in the Table for hold beam stringer plates, and to be six-sixteenths of an inch in thickness where the plating number is under 14,000, and seven-sixteenths of an inch where the plating number is 14,000 or above.

*All stringer plates* are to maintain their midship breadth for one-half the vessel's length amidships, from thence the breadth may be gradually reduced to that given above for the ends of the vessel.

Where a reduction of two-sixteenths of an inch from the midship thickness is allowed for the ends, the stringer plates may be reduced one-sixteenth of an inch in thickness for one-eighth of the vessel's length before and abaft the half length amidships, and from thence to the ends they may be reduced another sixteenth of an inch in the thickness.

Where there is an *iron deck* prescribed either for the entire length of the vessel, or for half the length amidships, it is to be fitted to the upper deck beams in two decked vessels. In three decked vessels and spar-decked vessels it may be fitted either to the upper or middle deck beams.

In way of an *iron deck* or *half-iron deck*, the stringer plates may be reduced in width to one inch for every seven feet of the length of the vessel, but the thickness is to be as given above. Where more than one iron deck is required the stringer plates are to be of the breadth and thickness given in the Table.

Where an *iron deck* is prescribed in the Table to be fitted for one half the vessel's length amidships, it is to be maintained the full breadth of the vessel for that length, and then tapered gradually into the stringer plates for one-eighth the vessel's length at each end.

*Orlop stringer plates* where required to be fitted, to be of the same thickness as the hold beam stringer plates, and three-fourths the breadth of the same.

Diagonal tie plates are to be fitted on the beams of all sailing vessels in way of the masts at the deck on which they are wedged, and in addition, where the plating number is 15,000 and above, diagonal tie plates are to be fitted all fore and aft on the upper deck.

In sailing vessels whose plating number is under 15,000, and in steam vessels not requiring an iron deck, if *diagonal tie plates* be fitted on the beams in sufficient number, and to the satisfaction of the Surveyor, their breadth as given in the Table may be deducted from the breadth given above for the stringer plates amidships, in which case the stringer plates may be reduced in breadth at the ends of the vessel to three-fourths of their breadth amidships.

*Lloyd's Register of Shipping*, 2, *White Lion Court, E.C.*,
*5th June*, 1884.

# IRON VESSELS.

## TABLE G 5.

### Showing diameters and spacing of Rivets and breadths of Straps and Laps.

| | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. | Ins. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thickness of PLATES | $\frac{5}{16}$ | $\frac{6}{16}$ | $\frac{6\text{ \& }7}{16}$ altrnatly | $\frac{7}{16}$ | $\frac{8}{16}$ | $\frac{9}{16}$ | $\frac{9\text{ \& }10}{16}$ altrnatly | $\frac{10}{16}$ (b) | $\frac{11}{16}$ | $\frac{12}{16}$ | $\frac{12\text{ \& }13}{16}$ altrnatly | $\frac{13}{16}$ | $\frac{14}{16}$ | $\frac{15}{16}$ | $\frac{16}{16}$ |
| Diameter of RIVETS | $\frac{5}{8}$ | $\frac{5}{8}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{7}{8}$ | $\frac{7}{8}$ | $\frac{7}{8}$ | 1 | 1 | 1 | $1\frac{1}{8}$ | $1\frac{1}{8}$ |
| Breadth of TREBLE riveted STRAPS | .... | .... | .... | .... | $14\frac{1}{4}$ | $14\frac{1}{4}$ | $14\frac{1}{4}$ | $16\frac{3}{4}$ | $16\frac{3}{4}$ | $16\frac{3}{4}$ | 19 | 19 | 19 | $21\frac{1}{4}$ | $21\frac{1}{4}$ |
| ,, ,, DOUBLE ,, ,, | 8 | 8 | $9\frac{3}{4}$ | $9\frac{3}{4}$ | $9\frac{3}{4}$ | $9\frac{3}{4}$ | $9\frac{3}{4}$ | $11\frac{1}{4}$ | $11\frac{1}{4}$ | $11\frac{1}{4}$ | .... | .... | .... | .... | .... |
| ,, ,, DOUBLE ,, LAPS | $3\frac{3}{4}$ | $3\frac{3}{4}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $5\frac{1}{4}$ | $5\frac{1}{4}$ | $5\frac{1}{4}$ | 6 | 6 | 6 | $6\frac{3}{4}$ | $6\frac{3}{4}$ |
| ,, ,, SINGLE ,, ,, | $2\frac{1}{4}$ | $2\frac{1}{4}$ | $2\frac{1}{2}$ | $2\frac{1}{2}$ | $2\frac{1}{2}$ | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| MAXIMUM Spacing of Rivets from centre to centre.... in BUTTS of outside plating | $2\frac{1}{2}$ | $2\frac{1}{2}$ | 3 | 3 | 3 | 3 | 3 | $3\frac{1}{2}$ | $3\frac{1}{2}$ | $3\frac{1}{2}$ | 4 | 4 | 4 | $4\frac{1}{2}$ | $4\frac{1}{2}$ |
| in EDGES ,, ,, | $2\frac{3}{4}$ | $2\frac{3}{4}$ | $3\frac{3}{8}$ | $3\frac{3}{8}$ | $3\frac{3}{8}$ | $3\frac{3}{8}$ | $3\frac{3}{8}$ | 4 | 4 | 4 | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | 5 | 5 |
| in FRAMES | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 8 | 8 | 8 | .... | .... |

### Minimum number of Rivets in edges of Plating between Frames AMIDSHIPS.

| | NUMBER OF RIVETS IN EACH ROW. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIAMETER OF RIVETS..... | Ins. $\frac{5}{8}$ | Ins. $\frac{5}{8}$ | Ins. $\frac{3}{4}$ | Ins. $\frac{3}{4}$ | Ins. $\frac{3}{4}$ | Ins. $\frac{3}{4}$ | Ins. $\frac{3}{4}$ | Ins. $\frac{7}{8}$ | Ins. $\frac{7}{8}$ | Ins. $\frac{7}{8}$ | Ins. 1 | Ins. 1 | Ins. 1 | Ins. $1\frac{1}{8}$ | Ins. $1\frac{1}{8}$ |
| Spacing of FRAMES .....20 ins..... | 7 | 7 | 5 | 5 | 5 | 5 | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| ,, ,, ,, .....21 ,, ..... | .... | 7 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | .... | .... | .... | .... | .... | .... |
| ,, ,, ,, .....22 ,, ..... | .... | .... | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | .... | .... | .... | .... | .... |
| ,, ,, ,, .....23 ,, ..... | .... | .... | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | .... | .... |
| ,, ,, ,, .....24 ,, ..... | .... | .... | 7 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 5 | 5 | 5 | .... | .... |
| ,, ,, ,, .....26 ,, ..... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | 5 | 5 | 5 |

*Where the fore and aft flange of the frame does not exceed 3 inches, the rivets attaching the outside plating thereto should not exceed $\frac{7}{8}$ inch in diameter, and where it is $3\frac{1}{2}$ inches wide, they should not exceed 1 inch in diameter.*

*(b) Where stringer and tie plates are $\frac{10}{16}$ of an inch thick, they should be secured to the beams with $\frac{3}{4}$ of an inch rivets.*

RIVETS to be $\frac{1}{4}$ of an inch larger in diameter in the **STEM, STERN POST** and **KEEL**, but in no case need these exceed $1\frac{1}{4}$ inches in diameter.

RIVETS in **RUDDER** to be of not less size than required for the upper edge of garboard strake amidships. *See* Section 36.

*Lloyd's Register of Shipping,*
*2, White Lion Court, Cornhill, 5th June, 1884.*

# TABLE OF SCANTLINGS FOR DOUBLE BOTTOMS CONSTRUCTED ON THE CELLULAR SYSTEM.

| PLATING NUMBER FOR REGULATING SCANTLINGS. | Centre Girder. — Depth above Top of Keel and Thickness. | Thickness of Side Girders | Margin Plate. — Depth (exclusive of Flange) and Thickness. | Thickness of Inner Bottom Plating. | | | Thickness of Brack't on Floor Plates. | DIMENSIONS OF ANGLE IRONS. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Middle Line Strake. | In Engine and Boiler Space. | In Holds. | | On Centre Girder. | On Margin Plates. | On Side Girders, Intermediate, and Vertical Angle Irons. |
| —— under 11,000 | 32 × $\frac{8}{16}$ | $\frac{5}{16}$ | 18 × $\frac{6}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | $\frac{5}{16}$ | $\frac{5}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3 × 3 × $\frac{6}{16}$ | 3 × 2$\frac{1}{2}$ × $\frac{5}{16}$ |
| 11,000 and under 13,000 | 33 × $\frac{8}{16}$ | $\frac{6}{16}$ | 19 × $\frac{7}{16}$ | $\frac{7}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3 × 2$\frac{1}{2}$ × $\frac{6}{16}$ |
| 13,000 ,, 15,000 | 34 × $\frac{8}{16}$ | $\frac{6}{16}$ | 20 × $\frac{7}{16}$ | $\frac{7}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3 × 3 × $\frac{6}{16}$ |
| 15,000 ,, 18,000 | 35 × $\frac{9}{16}$ | $\frac{6}{16}$ | 21 × $\frac{7}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | 4 × 4 × $\frac{8}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3 × 3 × $\frac{6}{16}$ |
| 18,000 ,, 21,000 | 36 × $\frac{9}{16}$ | $\frac{6}{16}$ | 22 × $\frac{7}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | 4 × 4 × $\frac{9}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ | 3 × 3 × $\frac{7}{16}$ |
| 21,000 ,, 24,000 | 38 × $\frac{10}{16}$ | $\frac{6}{16}$ | 24 × $\frac{7}{16}$ | $\frac{9}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{6}{16}$ | 4 × 4 × $\frac{9}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{8}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ |
| 24,000 ,, 28,000 | 40 × $\frac{10}{16}$ | $\frac{7}{16}$ | 26 × $\frac{7}{16}$ | $\frac{9}{16}$ | $\frac{7}{16}$ | $\frac{6}{16}$ | $\frac{7}{16}$ | 4 × 4 × $\frac{9}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{8}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ |
| 28,000 ,, 33,000 | 42 × $\frac{10}{16}$ | $\frac{7}{16}$ | 28 × $\frac{8}{16}$ | $\frac{9}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{7}{16}$ | 4 × 4 × $\frac{9}{16}$ | 4 × 4 × $\frac{8}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{7}{16}$ |
| 33,000 ,, 38,000 | 44 × $\frac{10}{16}$ | $\frac{7}{16}$ | 30 × $\frac{8}{16}$ | $\frac{10}{16}$ | $\frac{8}{16}$ | $\frac{7}{16}$ | $\frac{7}{16}$ | 4 × 4 × $\frac{9}{16}$ | 4 × 4 × $\frac{8}{16}$ | 3$\frac{1}{2}$ × 3$\frac{1}{2}$ × $\frac{8}{16}$ |

*No. 2, White Lion Court, Cornhill, London, E.C.,*
*26th April,* 1883.

# TABLE G 7.

## Suggested Sizes and Scantlings for Masts and Bowsprits of Sailing Vessels and Full-rigged Steam Vessels.

### Iron Masts.

| | Length. | Partners. Diameter. | Partners. Thickness. | Heel. Diameter. | Heel. Thickness. | Hounds. Diameter. | Hounds. Thickness. | Head. Diameter. | Head. Thickness. | Sizes of Angle Irons in Masts. | Cheeks. Thickness of Plate. | Cheeks. Sizes of Angle Iron. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Two Plates in the Round.* | 48 | 17 | 5/16 | 13 | 4/16 | 13 1/2 | 4/16 | 11 1/2 | 3/16 | ... | 7/16 | 3 1/2 × 2 1/2 × 6/16 |
| | 51 | 18 | 5/16 | 13 1/2 | 4/16 | 14 | 4/16 | 12 | 4/16 | ... | 7/16 | 3 1/2 × 3 × 6/16 |
| | 54 | 19 | 5/16 | 14 | 4/16 | 15 | 4/16 | 13 | 4/16 | ... | 7/16 | 3 1/2 × 3 × 6/16 |
| | 57 | 20 | 6/16 | 15 | 5/16 | 16 | 5/16 | 13 1/2 | 4/16 | ... | 8/16 | 4 × 3 × 7/16 |
| | 60 | 21 | 6/16 | 16 | 5/16 | 17 | 5/16 | 14 | 5/16 | ... | 8/16 | 4 × 3 × 7/16 |
| | 63 | 22 | 6/16 | 16 1/2 | 5/16 | 18 | 5/16 | 15 | 5/16 | ... | 8/16 | 4 × 3 × 7/16 |
| *Three Plates in the Round.* | 66 | 23 | 6/16 | 17 | 5/16 | 18 1/2 | 5/16 | 15 1/2 | 5/16 | ... | 8/16 | 4 1/2 × 3 × 7/16 |
| | 69 | 24 1/2 | 6/16 | 18 | 5/16 | 19 | 5/16 | 16 | 5/16 | ... | 8/16 | 4 1/2 × 3 × 8/16 |
| | 72 | 26 | 6/16 | 19 | 5/16 | 20 | 5/16 | 17 | 5/16 | ... | 8/16 | 4 1/2 × 3 × 8/16 |
| | 75 | 27 | 7/16 | 19 1/2 | 6/16 | 21 | 6/16 | 17 1/2 | 6/16 | ... | 9/16 | 5 × 3 × 8/16 |
| | 78 | 28 | 7/16 | 20 | 6/16 | 22 | 6/16 | 18 | 6/16 | ... | 9/16 | 5 × 3 × 9/16 |
| | 81 | 29 | 8/16 | 21 | 6/16 | 22 1/2 | 6/16 | 19 | 6/16 | ... | 9/16 | 5 × 3 1/2 × 9/16 |
| | 84 | 30 | 8/16 | 22 | 6/16 | 23 | 6/16 | 19 1/2 | 6/16 | 3 1/2 × 3 × 7/16 | 10/16 | 5 × 3 1/2 × 9/16 |
| | 87 | 31 | 8/16 | 22 1/2 | 6/16 | 24 | 6/16 | 20 | 6/16 | 4 × 3 × 7/16 | 10/16 | 5 1/2 × 4 × 10/16 |
| *Four Plates in the Round.* | 90 | 32 | 8/16 | 23 | 7/16 | 25 | 7/16 | 21 | 6/16 | 4 × 3 × 7/16 | 10/16 | 6 × 4 × 10/16 |
| | 93 | 33 | 9/16 | 24 | 7/16 | 26 | 7/16 | 21 1/2 | 6/16 | 4 × 3 × 8/16 | 11/16 | 6 × 4 × 10/16 |
| | 96 | 34 | 9/16 | 25 | 7/16 | 26 1/2 | 7/16 | 22 | 6/16 | 4 1/2 × 3 × 8/16 | 11/16 | 6 × 4 × 10/16 |

### Iron Bowsprits.

| Length outside Bed. | Bed. Diameter. | Bed. Thickness. | Heel. Diameter. | Heel. Thickness. | Cap. Diameter. | Cap. Thickness. | Sizes of Angle Irons. |
|---|---|---|---|---|---|---|---|
| 14 | 17 1/2 | 5/16 | 14 1/2 | 5/16 | 12 | 4/16 | 2 1/2 × 2 × 5/16 |
| 15 | 18 1/2 | 5/16 | 15 1/2 | 5/16 | 12 1/2 | 5/16 | 2 1/2 × 2 × 5/16 |
| 16 | 20 | 5/16 | 16 1/2 | 5/16 | 13 | 5/16 | 3 × 2 × 5/16 |
| 17 | 21 1/2 | 6/16 | 18 | 6/16 | 14 | 5/16 | 3 × 2 × 5/16 |
| 18 | 23 | 6/16 | 19 | 6/16 | 15 | 5/16 | 3 × 2 1/2 × 5/16 |
| 19 | 24 1/2 | 6/16 | 20 | 6/16 | 16 | 5/16 | 3 × 3 × 6/16 |
| 20 | 26 | 7/16 | 21 | 6/16 | 16 1/2 | 6/16 | 3 1/2 × 3 × 6/16 |
| 21 | 27 | 7/16 | 22 | 6/16 | 17 1/2 | 6/16 | 3 1/2 × 3 × 6/16 |
| 22 | 28 | 7/16 | 23 | 6/16 | 18 1/2 | 6/16 | 4 × 3 × 7/16 |
| 23 | 30 | 8/16 | 24 | 7/16 | 19 | 6/16 | 4 × 3 1/2 × 7/16 |
| 24 | 31 | 8/16 | 25 | 7/16 | 20 | 6/16 | 4 × 3 1/2 × 7/16 |
| 25 | 32 | 8/16 | 26 | 7/16 | 21 | 6/16 | 4 1/2 × 3 1/2 × 8/16 |
| 26 | 33 | 8/16 | 27 | 7/16 | 21 1/2 | 6/16 | 4 1/2 × 3 1/2 × 8/16 |
| 27 | 35 | 8/16 | 28 | 7/16 | 22 | 6/16 | 4 1/2 × 3 1/2 × 8/16 |

*Lloyd's Register of British & Foreign Shipping, 2, White Lion Court, London.*—15th August, 1878.

Suggestions for the Construction of Iron Masts, Bowsprits, and Yards.—The Iron used in the construction of masts, bowsprits, and yards, should be of a good malleable quality and quite free from surface or other defects. The iron should stand a tensile strain of 20 tons to the square inch, and should be capable of standing the following bending tests when cold without fracture:—

| Thickness of Plates. | To Bend Cold through an Angle of | |
|---|---|---|
| | With the Grain. | Across the Grain. |
| 9/16 | 25° | 8° |
| 8/16 | 30° | 11° |
| 7/16 | 37° | 13° |
| 6/16 | 47° | 15° |
| 5/16 | 55° | 17° |
| 4/16 | 65° | 20° |
| 3/16 | 70° | 25° |

The plates to be bent over a slab, the corner of which should be rounded with a radius of half an inch.

Lower Masts.—The plating should be of the thickness, and the plates arranged as suggested in the Table. The seams should be double riveted. The butts below the mast partners in masts, and those inside the wedging of bowsprits, might be double riveted, the remainder should be treble riveted. The butt straps in all cases should be 1/10 of an inch thicker than the plates they connect, and would be better to be fitted on the outside of the masts and bowsprit. The mast and bowsprit plates should be doubled in way of the wedging, or otherwise efficiently strengthened. The heels of all masts and their steps should be efficiently strengthened. The cheeks of masts should be stiffened by angle irons or cope iron on their foremost edges; or by some other approved plan.

Where two plates in the round are allowed instead of three, the iron should be of such superior quality as to admit of its being bent to the required form, without being unduly heated, to a fair curve and without fracture, and in all such cases the masts should be stiffened by three angle-irons as provided for in the Suggested Tables.

All masts of 84 feet length and above, to be fitted with angle irons properly shifted and extending the whole length of the mast. If the plates be arranged as described in the Tables, there should be an angle iron fitted to each plate in the round, of the size given in the Table.

All bowsprits exceeding 28 inches in diameter should have a vertical diaphragm plate extending from within the wedging to the gammoning, connected by continuous single angle irons to the upper and lower parts of the bowsprit, and two additional angle irons of the size given in the Table; and bowsprits 28 inches in diameter and under, to have an angle iron at the centre of each plate extending the whole length of the bowsprit.

Sketches of steel masts, bowsprits, and yards to be submitted for the approval of the Committee.

The attention of the Surveyors is to be especially directed to the fitments connected with the masts and rigging, in order to ensure the workmanship, material, and sizes of the same being efficient.

Where a Steamer is intended to be fitted with masts or a bowsprit for auxiliary purposes, they may be one-eighth less in diameter than prescribed by Table.

The mizenmasts for barques may be reduced one-fifth in diameter from that given in the Table, and the plating to be not less than the thickness corresponding to the diameters.

# TABLE G 8.

## SUGGESTED SIZES AND SCANTLINGS FOR YARDS AND TOPMASTS OF SAILING VESSELS AND FULL RIGGED STEAM VESSELS.

### IRON YARDS.

| LENGTH. | CENTRE. | | 1st Quarter. | | 2nd Quarter | | 3rd Quarter | | ENDS. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Diameter. | Thickness. | Diameter. | Thickness. | Diameter. | Thickness. | Diameter. | Thickness. | Diameter. | Thickness. |
| 32 | 8 | 3/16 | 7 7/8 | 3/16 | 7 1/4 | 3/16 | 6 | 3/16 | 4 | 2/16 |
| 36 | 9 | 3/16 | 8 3/4 | 3/16 | 8 1/8 | 3/16 | 6 3/4 | 3/16 | 4 1/2 | 2/16 |
| 40 | 10 | 3/16 | 9 3/4 | 3/16 | 9 | 3/16 | 7 1/2 | 3/16 | 5 | 2/16 |
| 44 | 11 | 3/16 | 10 3/4 | 3/16 | 10 | 3/16 | 8 1/4 | 3/16 | 5 1/2 | 2/16 |
| 48 | 12 | 4/16 | 11 3/4 | 4/16 | 10 3/4 | 3/16 | 9 | 3/16 | 6 | 2/16 |
| 52 | 13 | 4/16 | 12 5/8 | 4/16 | 11 3/4 | 3/16 | 9 3/4 | 3/16 | 6 1/2 | 2/16 |
| 56 | 14 | 4/16 | 13 5/8 | 4/16 | 12 5/8 | 4/16 | 10 1/2 | 3/16 | 7 | 2/16 |
| 60 | 15 | 4/16 | 14 5/8 | 4/16 | 13 1/2 | 4/16 | 11 1/4 | 3/16 | 7 1/2 | 2/16 |
| 64 | 16 | 5/16 | 15 5/8 | 5/16 | 14 3/8 | 5/16 | 12 | 4/16 | 8 | 3/16 |
| 68 | 17 | 5/16 | 16 1/2 | 5/16 | 15 1/4 | 5/16 | 12 3/4 | 4/16 | 8 1/2 | 3/16 |
| 72 | 18 | 5/16 | 17 1/2 | 5/16 | 16 1/4 | 5/16 | 13 1/2 | 4/16 | 9 | 3/16 |
| 76 | 19 | 6/16 | 18 1/2 | 5/16 | 17 1/8 | 5/16 | 14 1/4 | 4/16 | 9 1/2 | 3/16 |
| 80 | 20 | 6/16 | 19 1/2 | 5/16 | 18 | 5/16 | 15 | 4/16 | 10 | 3/16 |
| 84 | 21 | 7/16 | 20 1/2 | 6/16 | 19 | 5/16 | 15 3/4 | 5/16 | 10 1/2 | 4/16 |
| 88 | 22 | 7/16 | 21 1/2 | 6/16 | 19 3/4 | 5/16 | 16 1/2 | 5/16 | 11 | 4/16 |
| 92 | 23 | 7/16 | 22 1/2 | 6/16 | 20 3/4 | 6/16 | 17 1/4 | 5/16 | 11 1/2 | 4/16 |
| 96 | 24 | 7/16 | 23 3/8 | 6/16 | 21 5/8 | 6/16 | 18 | 5/16 | 12 | 4/16 |

### IRON TOPMASTS.

| LENGTH. | HEEL. | | Lower Part of Head. | | HEAD. | |
|---|---|---|---|---|---|---|
| | Diameter. | Thickness. | Diameter. | Thickness | Diameter. | Thickness. |
| 32 | 11 1/2 | 3/16 | 7 1/4 | 3/16 | 6 1/2 | 2/16 |
| 34 | 12 | 3/16 | 8 | 3/16 | 7 | 2/16 |
| 36 | 12 1/2 | 4/16 | 9 | 4/16 | 7 1/2 | 3/16 |
| 38 | 13 1/2 | 4/16 | 10 | 4/16 | 8 | 3/16 |
| 40 | 14 1/2 | 4/16 | 11 | 4/16 | 9 | 3/16 |
| 42 | 15 | 4/16 | 11 1/2 | 4/16 | 9 1/2 | 3/16 |
| 44 | 15 1/2 | 4/16 | 12 | 4/16 | 10 1/2 | 3/16 |
| 46 | 16 | 5/16 | 13 | 4/16 | 11 | 4/16 |
| 48 | 17 | 5/16 | 14 | 4/16 | 11 1/2 | 4/16 |
| 50 | 17 1/2 | 5/16 | 15 | 4/16 | 12 1/2 | 4/16 |
| 52 | 18 | 6/16 | 15 1/2 | 5/16 | 13 | 5/16 |
| 54 | 18 1/2 | 6/16 | 16 | 5/16 | 13 1/2 | 5/16 |
| 56 | 19 1/2 | 6/16 | 16 1/2 | 5/16 | 14 | 5/16 |
| 58 | 20 | 6/16 | 17 | 5/16 | 15 | 5/16 |
| 60 | 20 1/2 | 6/16 | 18 | 5/16 | 15 1/2 | 5/16 |
| 62 | 21 1/2 | 6/16 | 18 1/2 | 5/16 | 16 | 5/16 |
| 64 | 22 | 6/16 | 19 1/2 | 5/16 | 17 | 5/16 |

TOPMASTS.—The plating should be of the thickness given in the Table. The seams of topmasts may be single riveted; the butts should be treble riveted, and their straps 1/16 of an inch thicker than the plates they connect. There should be doubling plates in the way of the lower mast cap. Topmasts should be efficiently strengthened in the way of the fid holes and in the way of sheave holes where such are cut, by the doubling plates, iron hoops, or by other approved methods.

LOWER YARDS.—The plating should be of the thickness given in the Table. The seams of yards may be single riveted; their butts should be treble riveted, and connected by being overlapped, or by efficient butt straps. The plates should be doubled at the centre, and the doubling plates should extend beyond the truss hoops.

Where iron masts and yards are to be constructed otherwise than in accordance with the Tables plans and particulars of the same must be submitted for the approval of the Committee.

Where Steamers are intended to be fitted with topmasts for auxiliary purposes, they might be one-eighth less in diameter than prescribed by Table.

# TABLE G 9.

## SUGGESTED TABLE OF SIZES FOR THE IRON WIRE STANDING RIGGING, &c., OF SAILING SHIPS.

| REGISTER TONNAGE UNDER DECK. | Tons. 1,800 to 2,000. | | Tons. 1,600 to 1,800. | | Tons. 1,400 to 1,600. | | Tons. 1,200 to 1,400. | | Tons. 1,000 to 1,200. | | Tons. 800 to 1,000. | | Tons. 700 to 800. | | Tons. 600 to 700. | | Tons. 500 to 600. | | Tons. 400 to 500 | | Tons. 300 to 400. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Size. Inches. | No. | Size. Inches. | No. | Size. Inches | No. | Size. Inches. | No. | Size. Inches. | No. | Size. Inches. | No. | Size. Inches | No. | Size Inches | No. | Size. Inches. | No. | Size. Inches. | No. | Size. Inches |
| FORE & MAIN Shrouds ... | 6 and cap | $5\frac{1}{2}$ | 6 and cap | $5\frac{1}{4}$ | 6 and cap | 5 | 6 and cap | $4\frac{3}{4}$ | 6 and cap | $4\frac{1}{2}$ | 5 and cap | $4\frac{1}{4}$ | 5 and cap | 4 | 5 and cap | $3\frac{3}{4}$ | 5 | $3\frac{1}{2}$ | 4 | $3\frac{1}{4}$ | 4 | 3 |
| ,, ,, Chain plates | | $2\frac{1}{4}$ | | $2\frac{1}{8}$ | | 2 | | $1\frac{7}{8}$ | | $1\frac{3}{4}$ | | $1\frac{3}{4}$ | | $1\frac{5}{8}$ | | $1\frac{5}{8}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ |
| ,, ,, Dead-eyes ... | | $12\times7$ | | $11\frac{1}{2}\times6\frac{1}{2}$ | | $11\times6$ | | $10\frac{1}{2}\times6$ | | $10\times6$ | | $9\frac{1}{2}\times5\frac{1}{2}$ | | $9\times5\frac{1}{2}$ | | $8\frac{1}{2}\times5$ | | $8\times5$ | | $7\frac{1}{2}\times4\frac{1}{2}$ | | $7\times4\frac{1}{2}$ |
| ,, ,, Lanyards (hemp) | | 6 | | $5\frac{3}{4}$ | | $5\frac{1}{2}$ | | $5\frac{1}{4}$ | | 5 | | $4\frac{3}{4}$ | | $4\frac{1}{2}$ | | $4\frac{1}{4}$ | | 4 | | $3\frac{3}{4}$ | | $3\frac{1}{2}$ |
| ,, ,, Topmst. bckstys. | 3 | $5\frac{1}{2}$ | 3 | $5\frac{1}{4}$ | 3 | 5 | 3 | $4\frac{3}{4}$ | 3 | $4\frac{1}{2}$ | 2 | $4\frac{1}{4}$ | 2 | 4 | 2 | $3\frac{3}{4}$ | 2 | $3\frac{1}{2}$ | 2 | $3\frac{1}{4}$ | 2 | 3 |
| ,, ,, Top-gllt. bckstys. | 2 | 4 | 2 | $3\frac{3}{4}$ | 2 | $3\frac{1}{2}$ | 2 | $3\frac{1}{4}$ | 2 | $3\frac{1}{8}$ | 2 | 3 | | $2\frac{3}{4}$ | | $2\frac{5}{8}$ | | $2\frac{1}{2}$ | | $2\frac{1}{4}$ | | 2 |
| ,, ,, Lower stays ... | 2 | $5\frac{1}{2}$ | 2 | $5\frac{1}{4}$ | 2 | 5 | 2 | $4\frac{3}{4}$ | 2 | $4\frac{1}{2}$ | 2 | $4\frac{1}{4}$ | 2 | 4 | 2 | $3\frac{3}{4}$ | 2 | $3\frac{1}{2}$ | 2 | $3\frac{1}{4}$ | 2 | 3 |
| ,, ,, Topmast stays | 2 | $5\frac{1}{2}$ | 2 | $5\frac{1}{4}$ | 2 | 5 | 2 | $4\frac{3}{4}$ | 2 | $4\frac{1}{2}$ | 2 | $4\frac{1}{4}$ | 2 | 4 | | $3\frac{3}{4}$ | | $3\frac{1}{2}$ | | $3\frac{1}{4}$ | | 3 |
| ,, ,, Top-gallant stays | | 4 | | $3\frac{3}{4}$ | | $3\frac{1}{2}$ | | $3\frac{1}{4}$ | | $3\frac{1}{8}$ | | 3 | | $2\frac{3}{4}$ | | $2\frac{5}{8}$ | | $2\frac{1}{2}$ | | $2\frac{1}{4}$ | | 2 |
| MIZEN Shrouds... ... | 5 and cap | $4\frac{1}{2}$ | 5 and cap | $4\frac{1}{4}$ | 5 and cap | 4 | 5 and cap | $3\frac{3}{4}$ | 5 | $3\frac{1}{2}$ | 5 | $3\frac{3}{8}$ | 5 | $3\frac{1}{4}$ | 4 | $3\frac{1}{8}$ | 4 | 3 | 3 | $2\frac{7}{8}$ | 3 | $2\frac{3}{4}$ |
| ,, Topmast backstays ... | 3 | $4\frac{1}{2}$ | 3 | $4\frac{1}{4}$ | 3 | 4 | 3 | $3\frac{3}{4}$ | 3 | $3\frac{1}{2}$ | 2 | $3\frac{3}{8}$ | 2 | $3\frac{1}{4}$ | 2 | $3\frac{1}{8}$ | | 3 | | $2\frac{7}{8}$ | | $2\frac{3}{4}$ |
| ,, Top-gallant backstays | 2 | $3\frac{1}{4}$ | 2 | 3 | 2 | $2\frac{3}{4}$ | 2 | $2\frac{1}{2}$ | 2 | $2\frac{1}{4}$ | | $2\frac{1}{8}$ | | 2 | | 2 | | $1\frac{3}{4}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ |
| ,, Lower stays ... | 2 | $4\frac{1}{2}$ | 2 | $4\frac{1}{4}$ | 2 | 4 | 2 | $3\frac{3}{4}$ | 2 | $3\frac{1}{2}$ | | $3\frac{3}{8}$ | | $3\frac{1}{4}$ | | $3\frac{1}{8}$ | | 3 | | $2\frac{7}{8}$ | | $2\frac{3}{4}$ |
| ,, Topmast stays ... | 2 | $4\frac{1}{2}$ | 2 | $4\frac{1}{4}$ | 2 | 4 | 2 | $3\frac{3}{4}$ | | $3\frac{1}{2}$ | | $3\frac{3}{8}$ | | $3\frac{1}{4}$ | | $3\frac{1}{8}$ | | 3 | | $2\frac{7}{8}$ | | $2\frac{3}{4}$ |
| ,, Top-gallant stays | | $3\frac{1}{4}$ | | 3 | | $2\frac{3}{4}$ | | $2\frac{1}{2}$ | | $2\frac{1}{4}$ | | $2\frac{1}{8}$ | | 2 | | 2 | | $1\frac{3}{4}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ |
| BOBSTAY Bar ... ... | | $3\frac{3}{4}$ | | $3\frac{5}{8}$ | | $3\frac{1}{2}$ | | $3\frac{1}{4}$ | | 3 | | $2\frac{1}{2}$ | | $2\frac{1}{4}$ | | 2 | | 2 | | 2 | | 2 |
| ,, Pin ... | | $2\frac{3}{4}$ | | $2\frac{5}{8}$ | | $2\frac{1}{2}$ | | $2\frac{1}{4}$ | | $2\frac{1}{8}$ | | $1\frac{7}{8}$ | | $1\frac{5}{8}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ | | $1\frac{1}{2}$ |
| ,, Chain ... ... | | $1\frac{14}{16}$ | | $1\frac{13}{16}$ | | $1\frac{12}{16}$ | | $1\frac{10}{16}$ | | $1\frac{8}{16}$ | | $1\frac{6}{16}$ | | $1\frac{5}{16}$ | | $1\frac{4}{16}$ | | $1\frac{4}{16}$ | | $1\frac{4}{16}$ | | $1\frac{3}{16}$ |
| BOWSPRIT Shrouds ... | 2 | 1 | 2 | 1 | 2 | $\frac{7}{8}$ | 2 | $\frac{7}{8}$ | 2 | $1\frac{3}{16}$ | 2 | $1\frac{2}{16}$ | | $1\frac{2}{16}$ | | $1\frac{1}{16}$ | | $1\frac{0}{16}$ | | $\frac{9}{16}$ | | $\frac{9}{16}$ |

1.—The above requirements are intended to apply to vessels in which the dimensions of the masts and yards are such as would not be deemed unusual for vessels of the respective tonnages; where these dimensions are extreme, or where four masts are adopted instead of three, or in other exceptional cases where deviations from the above sizes are required, rigging plans showing the sizes and arrangements of the several parts should be submitted for the approval of the Committee.

2.—Where screws are fitted for the purpose of setting up the shrouds and backstays, a sketch of the same showing the dimensions of the several parts is to be submitted.

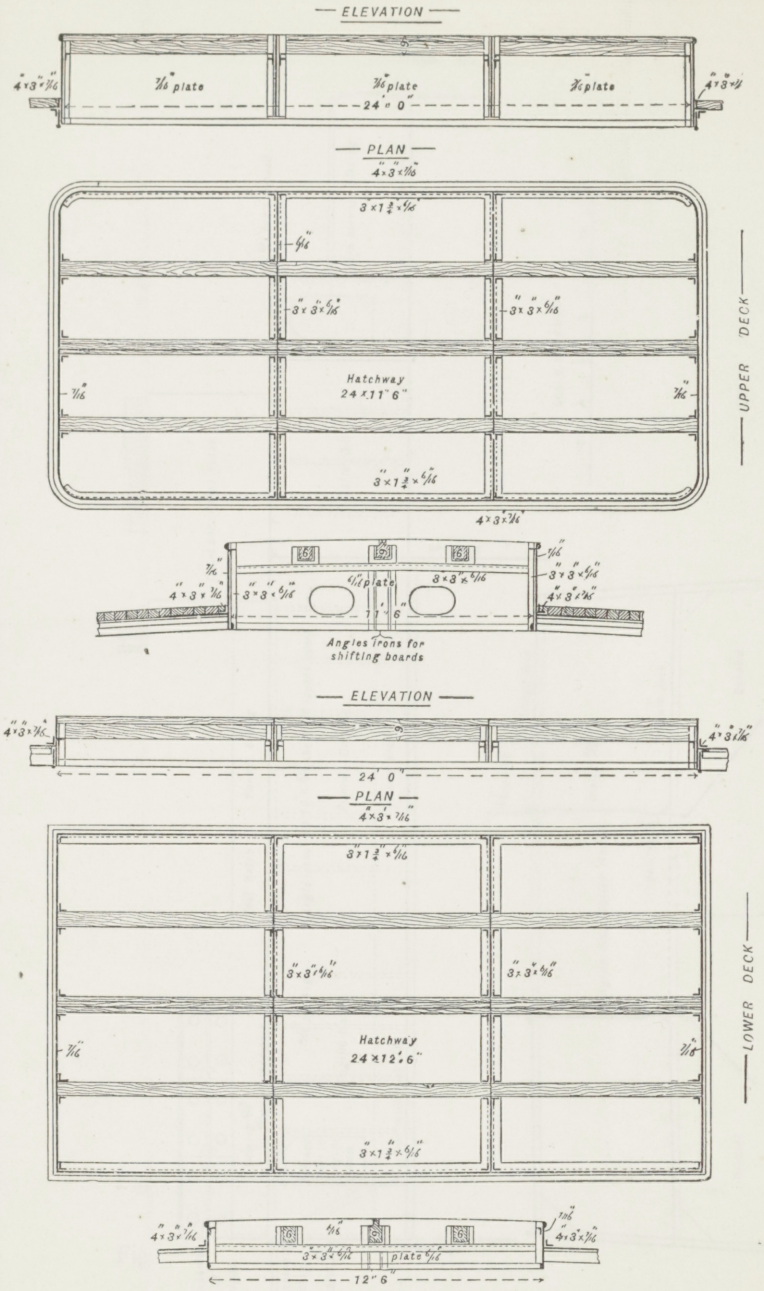
3.—Where it is proposed to adopt steel wire rigging, the following sizes are suggested in lieu of iron wire ropes for the same parts:—

| | In. | In. | In. | In. | In. | In. | In. | In. | In. | In. | In. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iron .. | $5\frac{1}{2}$ | $5\frac{1}{4}$ | 5 | $4\frac{3}{4}$ | $4\frac{1}{2}$ | $4\frac{1}{4}$ | 4 | $3\frac{3}{4}$ | $3\frac{1}{2}$ | $3\frac{1}{4}$ | 3 |
| Steel .. | $4\frac{3}{4}$ | $4\frac{1}{2}$ | $4\frac{1}{4}$ | $4\frac{1}{8}$ | 4 | $3\frac{3}{4}$ | $3\frac{1}{2}$ | $3\frac{1}{4}$ | 3 | $2\frac{3}{4}$ | $2\frac{1}{2}$ |

But in each case application must be made in the first place for the approval of the Committee, stating particulars of the manufacture and quality of the steel wire ropes proposed, and the tests which they are guaranteed to withstand.

4.—Where double top-gallant yards are to be adopted, a topmast cap backstay should be fitted.

*Lloyd's Register of British and Foreign Shipping*, 2, *White Lion Court, London.*—24th May, 1877.




*Sketch showing arrangement of Shifting Beams in Cargo Hatchways.*

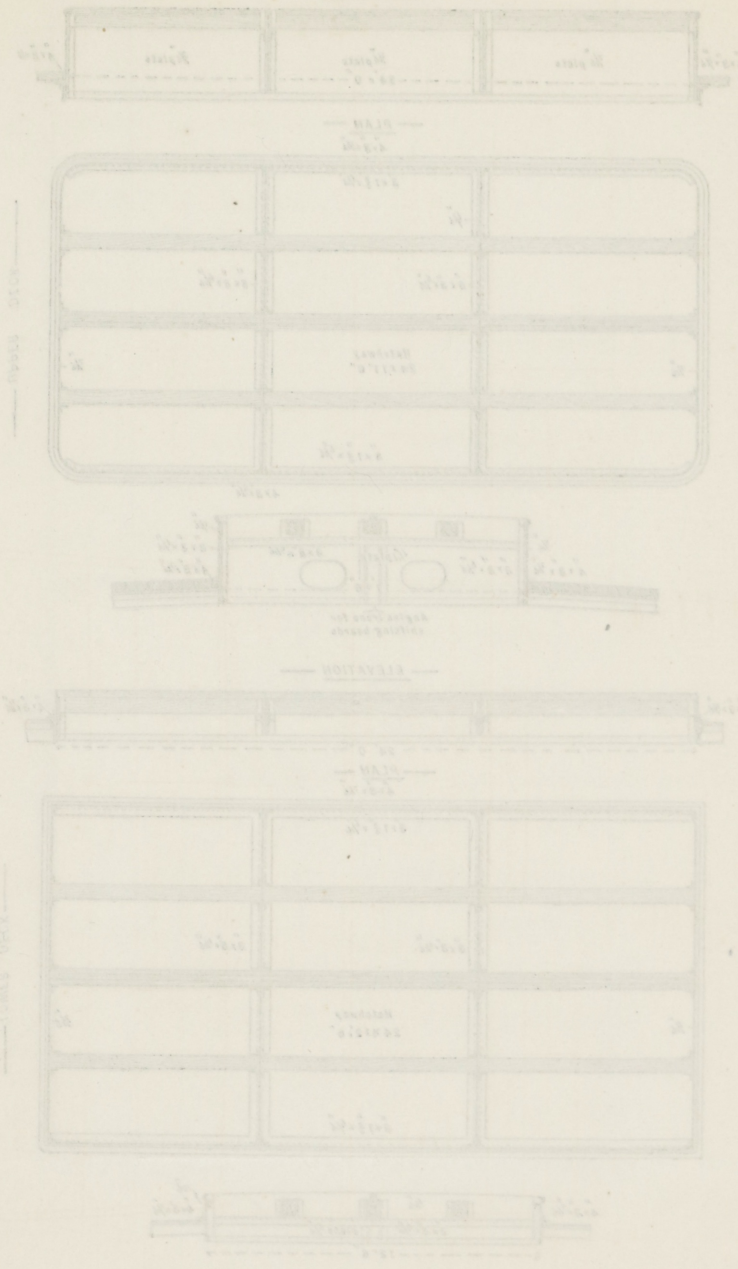


FIG. 1.

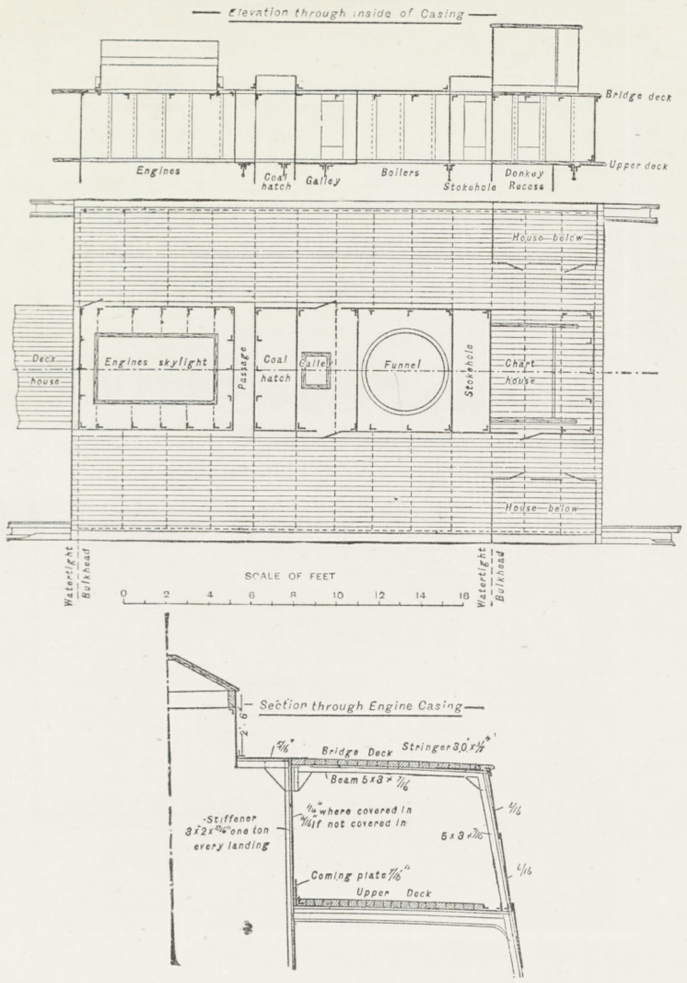



FIG 2.

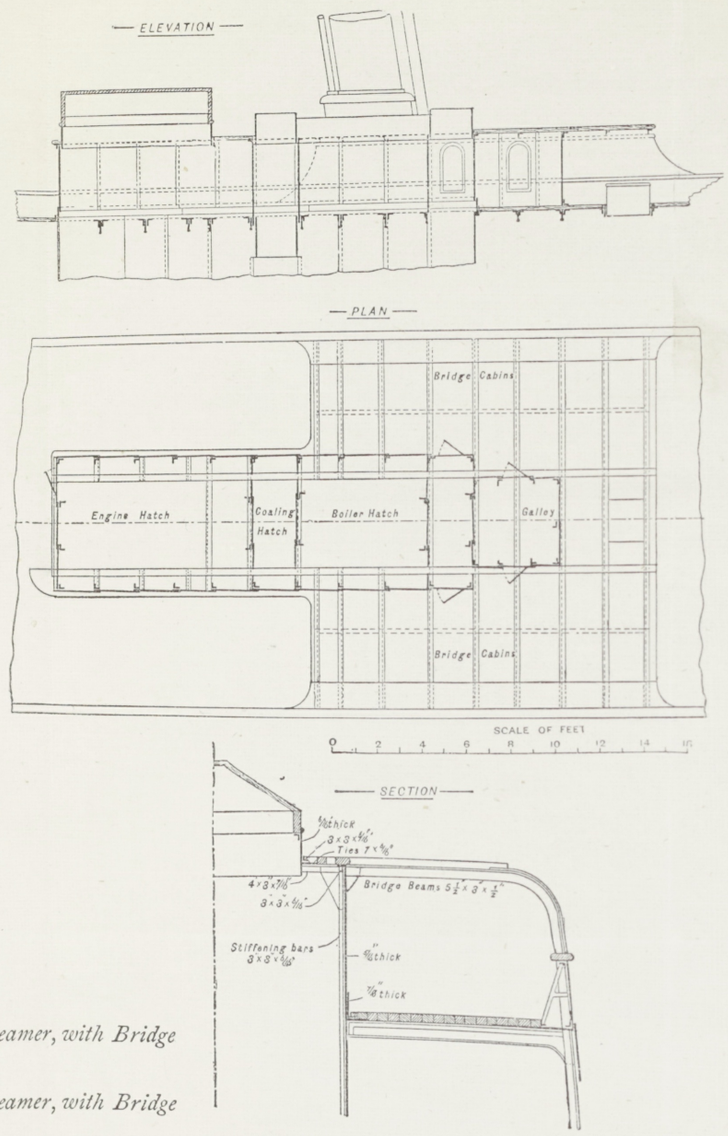



FIG. 3.

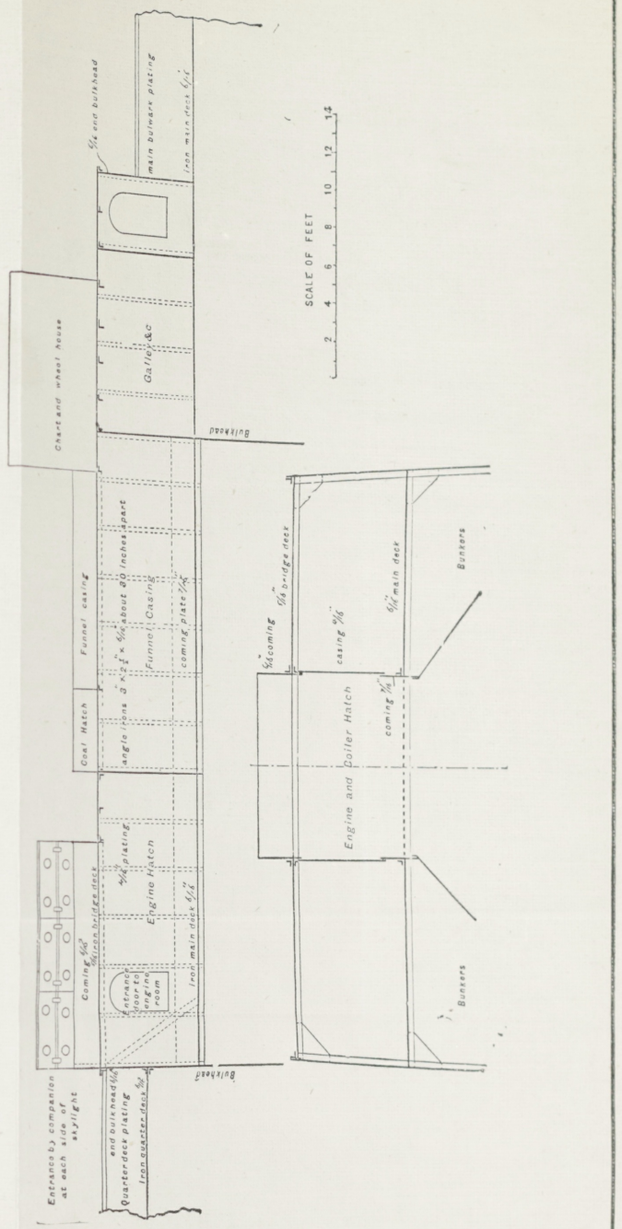



Fig. 1.—*Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck extending the whole length of the Openings.*

Fig. 2.—*Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck covering the Boiler Hatchway.*

Fig. 3.—*Sketch of Engine and Boiler Casings in a Vessel with a Long Raised Quarter Deck and Enclosed Bridge House.*

# LLOYD'S REGISTER

OF

# BRITISH AND FOREIGN SHIPPING.

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## RULES

FOR

## THE BUILDING AND CLASSIFICATION OF SHIPS BUILT OF WOOD.

# RULES FOR THE BUILDING AND CLASSIFICATION OF SHIPS BUILT OF WOOD.

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# RULES FOR WOOD SHIPS.

## CHARACTERS.

**Section 31.** 1. The characters assigned to ships to be, as nearly as possible, a correct indication of their real and intrinsic qualities,* and to be in all cases fixed (not by the Surveyors, but) by the Committee, after due consideration of the reports of the Surveyors, and such other documents as may be submitted to them, and will be distinguished as follows:—

### SHIPS CLASSED A.

2. To consist of new ships, or ships Continued, or Restored. (*Vide* Sections 34, and 54 to 59.)

### SHIPS CLASSED A, in Red.

3. To consist of ships which have passed the period assigned on the original Survey, or Continuation, or Restoration, and of ships not having had an original character, provided they are found on survey of superior description, fit for the conveyance of dry and perishable goods, *to and from all parts of the world.* (*Vide* Section 60.)

### SHIPS CLASSED Æ.

4. To consist of ships which are found on Survey fit for the safe conveyance of dry and perishable goods, on *shorter voyages*, and for the conveyance of cargoes not in their nature subject to sea damage on *any voyage.* (*Vide* Section 61.)

### SHIPS CLASSED E.

5. Will comprise ships which shall be found on Survey fit for the conveyance of cargoes not in their nature subject to sea damage *on any voyage.* (*Vide* Section 64.)

### FOREIGN BUILT SHIPS CLASSED F.†

6. Foreign Built Ships which have not been constructed in accordance with the Rules, and have not been surveyed by the Surveyors to this Society while building, have, upon survey, been assigned one of the two following designations of condition or character, thus, **1 F**,—**2 F**, if found eligible thereto. (*See* Section 83.)

7. It is to be distinctly understood that the following characters are confined in their application to *Foreign Built Ships.*

### SHIPS CLASSED 1 F.

8. **1 F** denotes ships which have been found on survey to be of a superior description, fit for the conveyance of dry and perishable goods to and from all parts of the world.

### SHIPS CLASSED 2 F.

9. **2 F** denotes ships which, although not equal to the foregoing, have nevertheless been found on survey to be in a good and efficient condition, and fit for the conveyance of dry and perishable goods, on shorter voyages.

* Ships which are not built in accordance with the principles of the Society's Rules will be marked in the Register Book thus "[*Expl. B.S.*]," denoting that they are built experimentally, and are classed subject to being surveyed biennially.

† Mem. 1st July, 1876:—*The Character* **F** *will not in future be assigned in the Classification of Ships. Those Ships, however, which have already been assigned this Character will be allowed to retain the same upon Periodical Survey in accordance with the requirements of Section* 83 *of the Rules. Owners of Ships so classed are, at the same time, invited to submit their Vessels for Classification with some other Character provided for in the Rules.*

## EQUIPMENT.

10. To entitle sailing ships to the Figure 1 for equipment, Sections 72 to 76 must be conformed to and stores supplied in accordance with Table 22, attached to the Rules.

11. For steam vessels *see* Sections 76 to 78, 81, and 82.

## EXPUNGING OR WITHDRAWAL OF CHARACTER.

12. The twelfth, thirteenth, and fourteenth Columns of the page of the Register Book left blank, indicate that the Vessel has never been Classed in the Register Book. Three dots (...) in Column 13 indicate that the Vessel was at one time Classed by this Society, but that the Class has been withdrawn at Owner's request. A black line with date under it in Column 14 indicates that, at that date, the Vessel, from reported defects, was not entitled to a Character in the Register Book. A red line with date under it in this Column indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules.

## TONNAGE FOR REGULATING THE SCANTLINGS AND EQUIPMENT (AS REGARDS ANCHORS, CHAINS, &c.) OF WOOD VESSELS.

**Section 32.** 1. In flush-decked vessels having either one, two, or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull, and also the equipment of the vessel, as regards anchors, chains, warps, &c.

2. In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, an awning deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power*, is to regulate the equipment.

3. But in vessels where the tonnage of the erections above the tonnage deck is less than that allowed for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment.

## RULES FOR CLASSIFICATION.

### SHIPS CLASSED A.

**Section 33.** 1. Will consist of new ships, and ships which have not passed a prescribed age, and also those which have a Continuation or Restoration of that character, provided they are kept in a state of complete repair and efficiency.

2. The Character A will not be granted to any vessel unless satisfactory evidence of the date, build, and place where built, is produced. (*See* Section 59, *foot-note.*)

**Section 34.** 1. The number of years to be assigned for Character A is to be determined with reference to the original construction and quality of the vessels, the materials employed, and the mode of building; and their continuance for the time so assigned to depend upon its being shown by occasional surveys (annually, if practicable) that their efficiency is duly maintained. (*See* N.B. at foot.)

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

2. Defects in workmanship or quality of timber will involve a reduction of class, to be determined by the Committee in each case.

## HALF-TIME OR INTERMEDIATE SURVEY.*

3. The Characters of ships classed A, or A in Red, will be struck out of the Register Book unless they be submitted to the following intermediate survey, within periods not exceeding four years in the case of vessels classed from six to eight years inclusive, either originally, or on Continuation, or on Restoration, or A in Red, and within periods not exceeding half that assigned in vessels classed for longer terms. Vessels classed for a less period than the above will not be required to undergo such half-time survey.

4. The survey will be noted in the Register Book thus,—"H.T." (half-time), with the date of the survey affixed.

## SURVEY.

5. The ship to be placed on blocks in dry dock, or on ways, so that the keel and bottom may be seen and properly examined (unless she has been thus surveyed by the Society's officers within the previous twelve months); the hold to be cleared, and proper stages made both inside and outside; the limbers, and all air courses to be cleared; and if the ship has not already got the air courses, described in Section 37 of the Rules, they are now to be made; the outside planking to be scraped bright where the Surveyors may consider it to be necessary from any apparent defect; bolts of lower deck (if of iron) in number not less than six on each side, and treenails in number not less than twelve on each side, to be driven out at various parts of the ship.

6. The attention of the Surveyors is to be then particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, *whether of iron or copper*, and the outside planks through which they pass, and to all other parts of the ship, so far as they can be examined.

7. All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

8. The windlass to be unhung and its wood lining sufficiently stripped for examination; the condition of the caulking is also to be ascertained.

9. The cables to be removed from the lockers and ranged, and, with the anchors, masts, spars, and general equipment, examined so as to be satisfactorily reported upon.

10. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout such vessels is to be ascertained and reported upon at the Half-time Survey, and, if necessary, the salt is to be renewed.

## SHIPS BUILT WITH MIXED TIMBER MATERIALS.

11. Ships built with Mixed Timber Materials below the fourteen years' grade, of superior workmanship, and in which *high* class materials and extra fastenings have been judiciously employed to such an extent as to satisfy the Committee, may be allowed a period of original designation exceeding that to which the material of the lowest class used would otherwise entitle them, such additional period not to exceed two years.

* For Composite Ships, *see* Section 43 of the Rule for Composite Ships.

12. Builders seeking this advantage must, in the first instance, submit, for the Committee's approval, a drawing of the midship section, with full details of construction and of the proposed materials and scantlings, through the resident Surveyor, who is to state to the Committee his opinion thereon, and the ship must be built under special survey.

13. No vessel already built, however, can have the advantage of the above rule, except a Special Survey be held on her to determine her claims thereto.

14. The highest (unless of a very limited quantity) and the lowest grade timber materials used in the construction of such Ships will be inserted in the Register Book.

*See Sections 57 and 58 as regards application of this Rule to ships surveyed for Restoration.*

## SURVEYS WHILE BUILDING.

### SPECIAL SURVEY.*

**Section 35.** 1. The Surveyors ar to examine, during the progress of a vessel, the materials and workmanship, from the laying of the keel to her completion; and to point out as early as possible anything that may be objectionable.

2. In Steam Vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

### NOT UNDER SPECIAL SURVEY.

3. New ships not building under Special Survey are to be surveyed by the Surveyors to this Society, in the following three stages of their progress, or they will be liable to lose one year of the period to which they might otherwise be entitled. (*See* Section 53.)

*First.*—When the Frame is completed, timbers dubbed fair inside and outside ready to receive planking and before any planking is wrought.

*Second.*—When the Beams are put in, but before the Decks are laid, and with at least two strakes of the plank of the ceiling between the lower deck and the bilge unwrought, to admit of an examination of the inner surface of the plank of the bottom.

*Third.*—When the Hull is completed, and before the plank is painted or payed.

4. All Ships for which a higher character than Ten Years A may be claimed, must be surveyed by an exclusive Officer of the Society, twice at least while building—namely, at the first and at the second stage of their progress as above prescribed. Due notice must be given by the Builder or Owner of their being ready for these surveys.

**Section 36.** A full statement of the dimensions, scantlings, &c., of all New Ships, verified by the Builder, is to be transmitted by the Surveyor, on a Form similar to No. 1 (*vide* page 153), which is to be kept as a record in the office of the Society.

## RULES TO BE OBSERVED IN BUILDING SHIPS.

**Section 37.** 1. The whole of the timber is to be of good quality and properly seasoned, and of the descriptions shown in Table A, as applicable to the several terms of years for which ships may respectively be appointed to remain on the Character A.

* This will entitle the Ship to the distinctive mark ✠

2. In ships claiming to stand twelve or fourteen years from their timber materials, the stem, sternpost, beams, transoms, apron, knightheads, and keelsons, are to be entirely free from sap and from all defects, The rest of the frame to be well squared and free from sap.

## SALTING.

3. One year for salting will be added to the term of classification to which a ship may otherwise be entitled, provided that *during her construction* the openings between the timbers of the frame, at the extremities of the vessel, from the deadwood to the height of the air-courses formed midway between the keelson and the hold beam clamps, and also the buttocks, be filled with salt, and the spaces between the upper air-course and the gunwale be filled before the planksheer is fitted; and that, *within six months of the date of launching*, the salting be completed so as to fill the spaces between the transoms and between the timbers of the frame at each end of the vessel for one-fifth her length, from the deadwood to the gunwale, and amidships from the upper part of the bilges to the gunwale, to the entire satisfaction of the Surveyor. For the purpose of retaining the salt between the timbers, stops are to be introduced immediately above all the air-courses and at the upper part of the bilges.

4. The keelson is also to be cased in and salted all fore and aft, excepting in vessels of 200 tons and under, when it will only be required to be cased in and salted for one-fifth of the vessel's length at each end.

5. In the case, however, of vessels entitled in other respects, from their wood materials, to a class not higher than 10 A, where the keelson is composed of *materials named in lines Nos.* 1 *and* 2 of Table A, it will not be necessary to salt the keelson, except at the ends.

6. The beams on which the weather-deck is to be laid, if salted, are to have a groove gouged on their upper side, except at their extreme ends; the groove to be in width not less than one-fourth the siding of the beam, and one inch in depth, and to be filled with salt as the deck is being laid; but, if not so salted, the beams, *when of wood of the nine years' grade and under*, of all ships to which a year has been or may be granted for "Salting" must, on the occasion of Half-time Survey, be exposed for examination by the removal of deck planking to the extent of one strake all fore and aft at each side of the ship, or to the satisfaction of the Surveyor.*

7, The state of the salting throughout such vessels is to be ascertained and reported upon at the Half-time and other Special Surveys, and, if necessary, the salt is to be renewed.

*Mem.*—The foregoing Rule is not to apply to ships built entirely of Teak.

*For application of this Rule in repair of ships under the Second Rule for Restoration, see Sections* 57 *and* 58.†

## WORKMANSHIP.

8 The workmanship in vessels is to be well executed, and equally so for all grades.

9. Each set of timbers to be frame-bolted together throughout their entire length; the butts of the timbers to be close, and not to be less than one-third of the entire moulding at that place.

* In cases where the beams have not been salted as above prescribed, the notation † will be added to the record in the Register Book—thus, *Salted.*†

† In cases of ships undergoing large repairs (or in other cases), and where ships have not been salted during construction, provided they are opened out to such an extent that the above requirements can be satisfactorily complied with, special application may be made to the Committee, with a view to having the additional year for salting granted.

10. In *all* ships building for classification, where the heads and heels are not full moulded, the timbers are to be well cross-chocked with a proper butt at each end of the chock, each arm to be not less in length than once and a half the moulding of the timbers they connect; in all cases the chocks are to be of a description of wood equal to the best material required by the Rules for the timbers which they unite, excepting the floor-head chocks, which may be of the materials allowed by the Rules for first futtocks.

11. Where the timbers are scarphed, the scarphs to be of proper length and with a butt at each end, and, in cases where the heads and heels of the timbers which come together are full moulded, a dowel (to be of the diameter from one-fourth to one-third of the moulding of the timber) must be introduced into the ends of such timbers in order to connect them; in the case, however, of vessels of 150 tons and under, provided the heads and heels of the frame timbers be otherwise properly secured to each other, dowels may be dispensed with.

## AIR-COURSES.

12. In all ships an air-course must be left all fore and aft, either immediately below or one strake below the clamps of each tier of beams; and, in addition, one or two tiers of air-courses must be left in the hold, between the keelson and hold beam clamp, for one-fifth the entire length of the ship at each end.

## POOPS AND FORECASTLES.

**Section 38.** 1. In the construction of top-gallant forecastles, and poops, the timbers must be of the same materials as are required by Table A for the top-timbers of the frames of ships according to the several terms of years appointed for such ships to remain on the character A, all the said timbers to extend to the plankshеer.

2. All the outside planking of top-gallant forecastles, and the sheerstrakes, planksheers, and spirketting of top-gallant forecastles and poops must be of the materials required by Table A for the topsides of the ship; and the shelf and clamps of poops and top-gallant forecastles may be of the same quality as those allowed in Table A for the shelf and clamp of the upper deck.

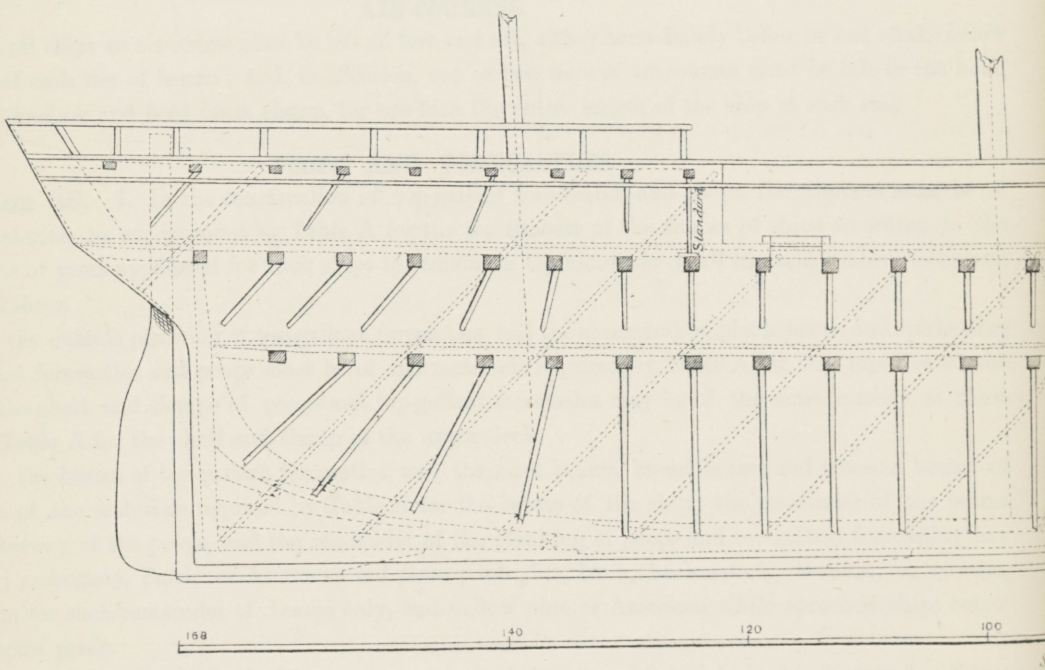
3. All the beams of top-gallant forecastles, and the mast beams, breast beams and transom beams of poops, to be of the materials required by Table A for the beams of the ship; the remainder of the beams and the waterway of the poops, and the remainder of the planking of poops and top-gallant forecastles may be of cedar, mahogany, Baltic or American red pine, pitch pine, larch, hackmatack, tamarac, or cowdie, and rock-elm for such remainder of beams only, and yellow pine or American white spruce in ships below the seven years' grade.

4. In the inside and outside planking, waterways, planksheers, and flat of deck of full poops * and top-gallant forecastles, a reduction of *one-fourth* from the thickness required by the Table B for such planks in the range of the upper deck in ships with two decks, will be allowed; and, in the siding andmoulding of the top-timbers and beams of full poops and top-gallant forecastles, a reduction of *one-fifth* will be allowed.

5. The united lengths of poop and forecastle are not to exceed three-fifths of the entire length of the upper deck.

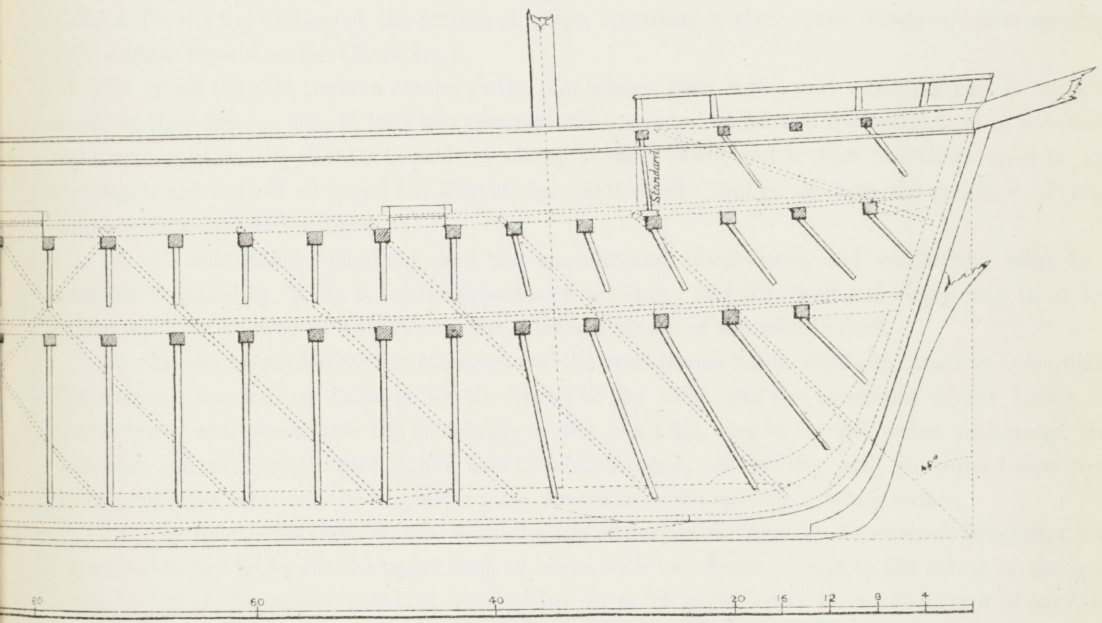
* Parties desirous of making any alteration in the construction of Poops, with a view to diminishing the weight (but preserving the requisite strength), may submit their plans for the Committee's consideration and approval.

*A plan shewing the direction of the Iron*
*prescribed in the*



*on Frames, and Iron Knees and Riders.*

*Sections 39 and 62.*



## RAISED QUARTER-DECKS.

6. The materials required for the construction of raised quarter-decks to be of the same quality as those named in Table A for the main body of the ship.

7. In the inside and outside planking, waterways, planksheers, and flat of deck of raised quarter-decks, a reduction of *one-fifth* from the thickness required by the Table B for such parts in the range of the upper deck in ships with two decks, will be allowed.

## SPAR DECKS.

8. In vessels having three decks or tiers of beams, where the space under the upper deck is to be used only for the accommodation of crew and passengers, or to enclose the engine openings of steam vessels, the scantlings are to be regulated as per Section 32.

9. The total depth of hold in spar-decked ships must not exceed thirteen-sixteenths, nor be less than twelve-sixteenths of the ship's extreme breadth.

10. In the construction of spar decks, the timbers must be of the same materials as are required by Table A for the top-timbers of the frames of ships, according to the several terms of years appointed for such ships to remain on the Character A.

11. If *all* the said timbers extend to the planksheer, their siding and moulding may be reduced one-fourth at their heads; but, if only the *alternate* timbers run up to the top height, then a reduction of one-fourth only will be allowed in their moulding at their heads, and in that case there must be a perfect covering board worked all round the ship at the middle deck; and in all cases the middle deck must be a complete deck laid and caulked.

12. All the outside planking, and the sheerstrakes, planksheers, and spirketting must be of the materials required by Table A for the topsides of the ship; and the shelf and clamp may be of the same quality as those allowed in Table A for the shelf and clamp of the middle deck.

13. All the beams before the foremast, and the mast beams, hatch beams, and transom beam, must be of the materials required by Table A for the beams of the ship; and the remainder of the beams and the waterways of spar deck, and the remainder of the planking, may be of red cedar, mahogany, Baltic or American red pine, pitch pine, larch, hackmatack, tamarac, or cowdie; and, in ships below the seven years' grade, the same may be of yellow pine, American white spruce, or white cedar.

14. In spar decks there may be a diminution of *one-fourth* from the dimensions, fastenings, and bolts prescribed in the tables for the upper deck of ships with two decks (except in the siding of the spar deck beams); but if the outside planking be of either 12 or 14 years' wood, then a reduction of *one-third* may be made in the thickness from that prescribed in Table B for the main sheerstrakes of such vessels.

15. Deckhouses or other erections are allowed on spar decks, but only to the extent of one-tenth of the total superficial area of the spar deck, and are not to exceed seven feet in height. They are not to be placed nearer to either of the ends than one-fifth of the entire length of the vefsel.

16. Vessels to which this rule applies, as regards an entire spar deck, will be noted in the Register Book thus—"*Spar decked.*"

## THREE-DECKED SHIPS.

17. All dimensions, fastenings, and bolts of the middle deck in vessels having three decks (viz., upper, middle, and lower deck), to be the same as those prescribed in the Tables for the upper deck of ships.

having only two decks; and a reduction of one-sixth from the dimensions, fastenings, and bolts prescribed in the Tables for the upper deck of vessels having only two (viz., upper and lower deck) will be allowed in the third or upper deck. The middle deck to be a complete deck, laid and caulked.

## SCANTLINGS.

**Section 39.** 1. The Scantlings of the timbers, keelson and keel, thickness of planking, &c., are not to be less than those shown in Table B. (*Vide* Section 32.)

2. The intermediate dimensions for the scantling of timbers between the floor-heads and the gunwale to be regulated in proportion to the distance from the two points.

3. Should the timber and space be increased, the siding of the timbers to be increased in proportion.

4. Whenever ships are built with double floors, thick strakes (*see* Table B) must be worked inside, to extend from the lower part of the short floor-head chocks to the upper part of the long floor-head chocks, and be well bolted through and clenched, with one bolt at the head of each long and short arm of floors, and at the heel of each first and second futtock which comes upon them, from the foremast extending a distance aft equal to three-fifths of the length of the ship; in such cases, the timber strakes need not be through bolted.

## FIR SHIPS OF 600 TONS AND ABOVE, AND ALL VESSELS EXCEEDING FIVE BREADTHS, OR EIGHT AND UNDER NINE DEPTHS IN LENGTH.

5. Ships built in the British North American Colonies, and all ships, the frames of which are composed of Fir, of 600 tons and upwards, and all ships (wherever built) the length of which (measured from the fore part of the stem to the after part of the sternpost on the range of upper deck) shall exceed *five* times their extreme breadth, or *eight* times and under *nine* times their depth, shall have diagonal iron plates closely inserted *outside* the frame.* The said plates to extend from the upper side of upper tier of beams to the lower part of chocks at first futtock heads amidships, and to the same perpendicular height forward and aft, measured from the lower part of the keel.

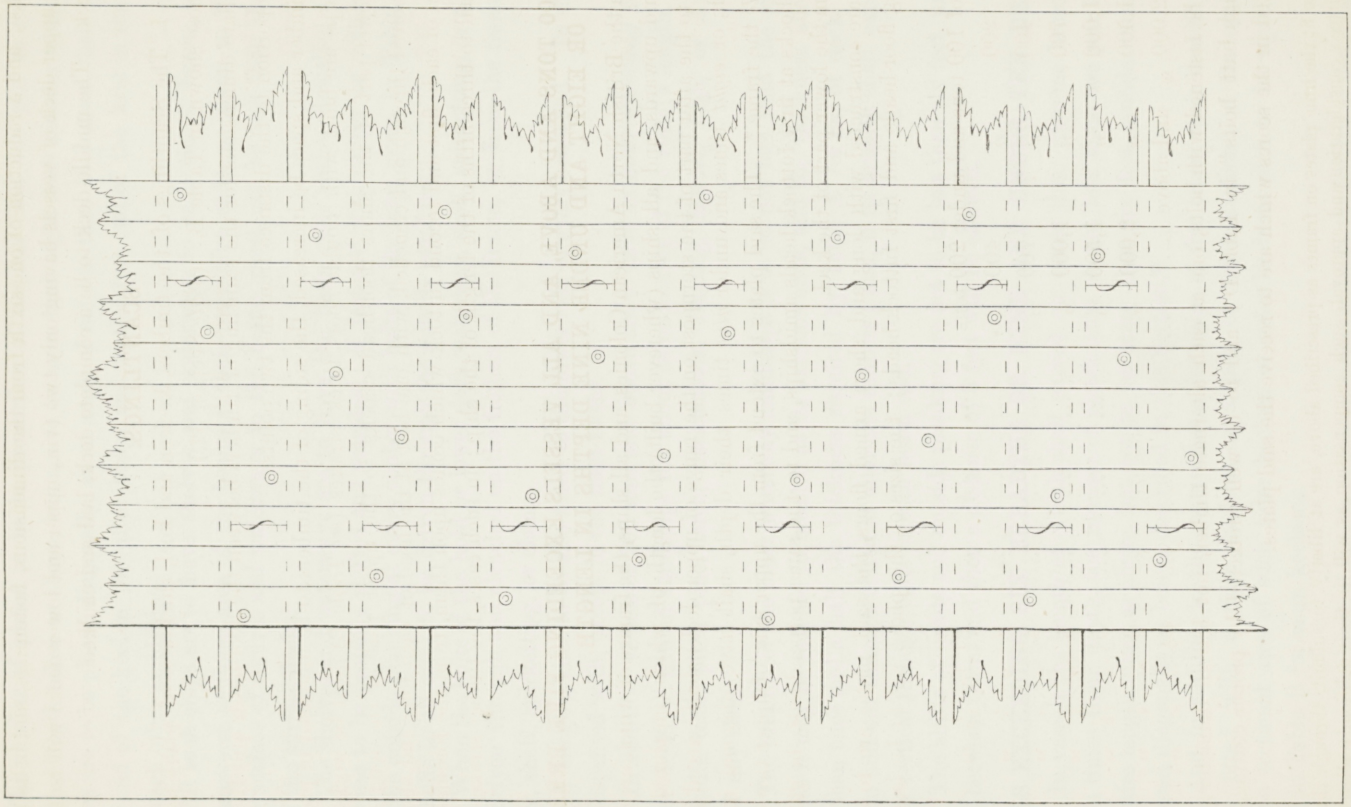
6. When ships are constructed with long and short armed floors, the said plates are to extend to half-way between long floor-heads and first futtock-heads; the sizes of the plates not to be less than as follows, viz.:—

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| In ships of | 100 | tons and under | 200 | tons | ... | ... | ... | $3\frac{1}{2}$ | by | $\frac{7}{16}$ | in. |
| „ | 200 | „ | 400 | „ | ... | ... | ... | 4 | „ | $\frac{1}{2}$ | „ |
| „ | 400 | „ | 700 | „ | ... | ... | ... | $4\frac{1}{2}$ | „ | $\frac{5}{8}$ | „ |
| „ | 700 | „ | 1,000 | „ | ... | ... | ... | 5 | „ | $\frac{3}{4}$ | „ |
| „ | 1,000 | „ | 1,500 | „ | ... | ... | ... | $5\frac{1}{2}$ | „ | $\frac{13}{16}$ | „ |
| „ | 1,500 | „ | 2,000 | „ | ... | ... | ... | 6 | „ | $\frac{7}{8}$ | „ |
| „ | 2,000 | „ and above | | | ... | ... | ... | $6\frac{1}{2}$ | „ | $\frac{7}{8}$ | „ |

7. The plates to be fastened with bolts, one at each alternate timber, not less in diameter than the sizes given for "through butt bolts" in Table D; and to be well protected by proper coating, likewise the timbers to be coated in the scores which are to receive the said plates.

* Parties objecting to fit the iron plates on frames as prescribed above, are at liberty to submit, through the resident Surveyor, for the Committee's consideration and approval, such compensation as will, in their opinion, render the introduction of the iron plates unnecessary.

SKETCH SHOWING THE ARRANGEMENT OF THROUGH BOLTS IN THICK STRAKES OVER DOUBLE FLOORS_SECTION 39.



8. The number of plates to be in proportion of not less than one pair to every twelve feet of the ship's entire length taken as above, but not to be more than eight feet asunder measured on a square; the said plates are to be placed diagonally, at an angle of not less than 45 degrees, their lower ends pointing to the after end of the keel in the after body, and to the fore end of the keel in the fore body, four pairs crossing each other amidships.

9. All such ships are to have shelves and waterways to each tier of beams, each equal in contents to the transverse sectional area of the beams at their respective ends, as given in Table C. The breadth or faying surface of shelves and waterways to the beams must not be less than the siding given for the beams of the surface decks.

10. The shelves and waterways are to have the beam ends either dowelled or dovetailed to them, and they are to be properly shifted and scarphed; if fastened with copper or yellow metal, to be bolted through the outside planking at every timber with bolts of the sizes given in Table D. The upper deck binding bolts in all cases to be driven through the outside planking.

11. When the bolts of the hold or lower deck waterway, shelf, spirketting, or clamp, are of *iron*, they may be driven through and clenched on the timbers of the frame, or from the frame and clenched on the waterway, shelf, spirketting, or clamp.

12. A hanging-knee to be also fitted to the lower side of every beam end. In such cases lodging-knees may be dispensed with, except in the mast-rooms.

13. In addition, vessels of 200 tons and above are to have an *inner waterway* fitted on the beams of the upper deck, to extend amidships for about three-fourths of the vessel's length. It may be composed of East India teak, pitch pine, larch, hackmatack, Dantzig, Memel, Riga, or American red pine, for vessels of any class.

14. The breadth of the inner waterway amidships is to be not less than the siding required for the beams, but it may be reduced in breadth at its extreme ends, and the thickness above the beams is to be not less than once and a half the thickness required by Table B for flat of deck. The inner waterway is to be in and out through bolted at alternate timbers; and, if its breadth shall exceed six inches, it is to have two vertical through bolts in each beam end.

15. The shifts of inside and outside planking are not to be less than six feet, unless there be a strake wrought between them, and then a distance of 5 feet will be allowed.

## VESSELS EXCEEDING SIX BREADTHS OR NINE AND UNDER TEN DEPTHS IN LENGTH.

16. In vessels the length of which shall exceed *six* times their extreme breadth, or *nine* times and under *ten* times their depth, the number of plates must be not less than one pair to every *ten* feet of the ship's entire length taken as above, but not to be more than six feet asunder measured on a square, and to be placed diagonally as before described in this Section.*

17. And in addition to the requirements for ships of five times their breadth in length such ships must be fitted with a rider keelson, or a pair of sister keelsons, at the option of the Owner, the transverse sectional area of such rider keelson or sister keelsons each to be equal to two-thirds of that required in Table B for main keelsons.

* In cases where the length of the ship exceeds ten times the depth, the Builders or Owners are to submit, through the resident Surveyor, for the Committee's approval, their plans for giving the vessel the necessar strength longitudinally.

18. If a rider keelson be adopted, it is to be fastened with a through bolt (of the size required in Table D for keelson bolts), in every frame; or, if the Owner prefers it, every intermediate bolt may be short, passing only through the main and rider keelsons.*

19. If sister keelsons be fitted, they must be fastened with through bolts, in number not less than one in every alternate timber, and of the size required in Table D for "scarphs of keels," &c.

## BEAMS.

**Section 40.** 1. The sizes of the deck and hold beams have been regulated so as to be determined by the length of the beams *amidships*, as shown in Table C. The beams will be required to be of the size of the midship beam, except those at the *after end* of the ship, which may be reduced in proportion to their length.

2 If beams of spruce or yellow pine are used, the siding of such beams shall be one-fourth larger than is prescribed by the above Table, or be increased each way, siding and moulding, equal in area to that amount.

## IRON BEAMS.

3. In cases where Iron Beams are fitted in Wood Ships the beams of the upper deck are to be one sixteenth of an inch thicker than is required by the Rules for ships built of Iron, in consequence of the greater space between; and the lower deck or hold beams are to be one-eighth of the depth deeper, and one sixteenth of an inch thicker, than the upper deck beams. The spaces between beams of the several decks not to exceed the spaces at present allowed for wood ships, as per Rule, Section 41. Each tier of beams must have stringer plates riveted on their ends, and tie plates fore and aft, on each side of the hatchways.

4. Parties are to submit, through the resident Surveyor, their plans for attaching Irom beams to the ship's sides, for the Committee's approval.

**Section 41.** 1. The beams of all decks to be in number and size as hereinafter specified, and to be securely fastened to the sides either with lodging-knees of iron or wood, or with a shelf-piece and waterways, as described in Section 39,† or with a shelf-piece and knees, or with some other security equal thereto.

## WATERWAYS AND SHELVES.

2. The depth of waterway required for faying surface against timbers, below the underside of the plankshеer, is to be as shown in Table B, to receive in and out bolts at alternate timbers, with alternate through bolts in shelf, and in clamp where there is no shelf.

3. Where shelves and waterways are fitted, each should equal in contents the transverse sectional area of the beams at their respective ends, as given in Table C. The breadth or faying surface of shelves and waterways to the beams must not be less than the siding given for the beams of the several decks.

* In all cases in which a rider keelson is fitted, it must be fastened as prescribed above, irrespective of the relative dimensions of the ship.

† When the shelves and waterways are fitted and bolted as described in Section 39, having also a hanging-knee to the lower side of every beam end, then lodging-knees may be dispensed with, except in the mast-rooms. In ships of 500 tons and under, where lodging-knees properly bolted are applied, the ordinary plank-clamps may be used, but the bolting of them at alternate timbers, as per Table B, cannot be dispensed with.

4. A hanging-knee to be also fitted to the lower side of every beam end. In such cases lodging-knees may be dispensed with, except in the mast-rooms.

5. The shelves and waterways are to have the beam ends either dowelled or dovetailed to them, and they are to be properly shifted and scarphed; if fastened with copper or yellow metal, to be bolted through the outside planking at every timber with bolts of the sizes given in Table D. The upper deck binding bolts in all cases to be driven through the outside planking.

6. When the bolts of the hold or lower deck waterway, shelf, spirketting, or clamp, are of *iron*, they may be driven through and clenched on the timbers of the frame, or from the frame and clenched on the waterway, shelf, spirketting, or clamp.

7. All vessels of 200 tons and above to have an inner waterway, as stated in Section 39.

8. All ships of 150 tons and above to have vertical knees to the DECK beams; and those of 200 tons and above to have vertical knees to the HOLD beams, in number as shown in Table E.

## DEPTH OF HOLD FOR SPACING OF BEAMS.

9. In vessels of 13 feet and under 15 feet depth of hold, the spacing of the hold beams not to exceed 8 feet apart, and the deck beams 4 feet. Vessels of 15 feet and under 18 feet hold, the spacing not to exceed 8 feet and 4 feet apart alternately, or in that proportion; the deck beams to be placed one over every hold beam, and one in all double spaces. In vessels of 18 feet hold and above, the spacing of the beams not to exceed 4 feet 6 inches; the deck beams to be one over every hold beam.

10. The depth in all such cases to be determined by taking the measure from the top of the limber-strake (the thickness of which, for measurement, is to be taken as prescribed in Table B) to the top of the upper deck beams.

11. Ships having a depth of hold, measured from the limber-strake to the under side of the lower deck beam, above 13 feet but not exceeding 15 feet, must be secured with iron riders of the sizes, and be fastened, as shown in Table F, and in number not less than one on every fourth floor, on each side, from fore side of foremast to aft side of mizen-mast, to extend from the lower deck beams downwards so as to receive not less than two bolts in a substantial part of the floors; or by orlop beams, sufficient in number and properly secured.

12. All ships having two decks (viz. upper and lower deck), and exceeding 24 feet in depth from the top of the limber-strake to the top of the upper deck beams, or having three decks (viz. upper, middle, and lower deck), and exceeding 24 feet in depth from the under side of the MIDDLE DECK, to have orlop beams, the number to be in no case less than one-half the number of lower deck beams in the space between the foremast and the mizen-mast, except in the case of flush deck ships, when a depth of 25 feet will be allowed, provided in either case the lower hold does not exceed 15 feet, measured as above from the limber-strakes to the under side of the lower deck beam. Should a house be constructed on such flush deck ship for lodging crew or for store-room, the same not to extend within 10 feet of the sternpost.

13. The application of this Rule to British North American built ships, and Fir Ships, will not exempt them from the full operation of the Rule, Section 62.

14. Every ship exceeding 150 tons to have at least one crutch for the security of the heels of the

after timber of the frame; one pair of pointers in addition to a knee at each end of the wing transom to connect the stern frame with the after-body of the ship; and a transom over the heels of the stern timbers properly kneed.

15. The heels of the cant timbers forward and aft to be stepped into the deadwood and bolted through.

16. All hatchways and mast holes to be properly framed to receive half beams where necessary, and to have mast partners to each tier of beams, except the orlop beams. The mast holes, skylights, and companions to be properly secured to the satisfaction of the Surveyors.

## FRAME.

**Section 42.** 1. All timbers of the frame, including those of the poop and forecastle, to extend to the extreme height.

2. The shifts of timber in vessels of 200 tons and upwards to be not less than one-seventh of their main breadth; and, in ships under 200 tons, to be not less than one-sixth of their main breadth.

## PLANKING.

**Section 43.** 1. The outside planking to be of good quality, of the description prescribed in Table A, to be clear of sap and free from all defects.

2. The inside planking to be of the description shown in Table A, and free from all foxy or druxy defects, and decayed knots. With regard to the ceiling plank, and the efficiency of its fastening, it will be required that the planking shall be properly shifted and fastened so that there shall be at least either treenails or through bolts, or short bolts, in each plank of the ceiling *in every timber*.

**Section 44.** 1. No butts to be nearer than 5 feet to each other (*see* Section 39, for vessels exceeding five breadths or eight and under nine depths in lengths), unless there be a strake wrought between them, and then a distance of 4 feet will be allowed; and no butts to be on the same timber, unless there be three strakes between, as more particularly shown in the diagram annexed (*see Plate*), but vessels under 200 tons will be exempted from the full operation of this rule; and in ships of larger tonnage a literal compliance with it will be dispensed with in cases wherein it may be satisfactorily proved that the departure from the rule is only partial, being confined to the ends of the ship, or the planking of the topside, and does not injuriously affect the ship's general strength; but such relaxation will not be sanctioned unless an accurate description of the shifting of the plank be transmitted by the Surveyors, to enable the Committee to form a proper judgment on the case.

2. The thickness of the plank, according to the tonnage of the ship, is not in any instance to be less than is prescribed in Table B.

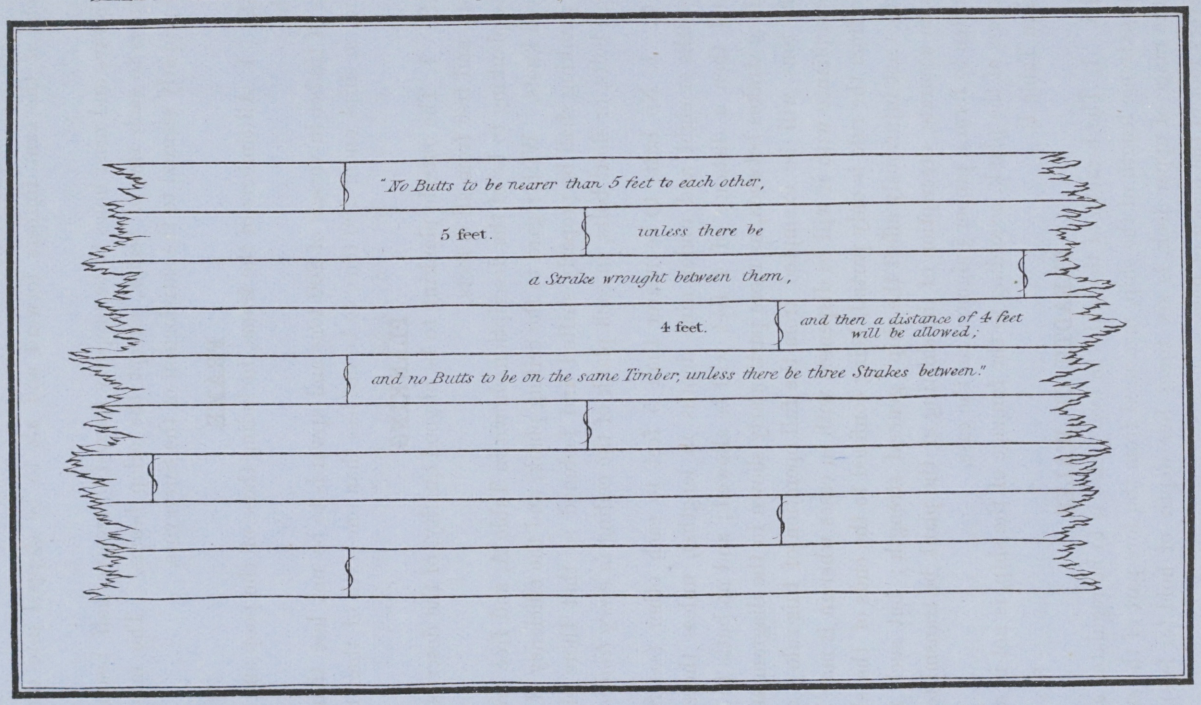
## BREADTH OF WALES.

**Section 45.** 1. The breadth of the wales in every case is to be regulated as under, viz. :—

2. When the extreme length of the ship, measured from the fore part of the stem to the after part of the sternpost on the range of upper deck, is six times her depth of hold (or less), the wales are to be in breadth 3 in. to every foot of the depth of hold.

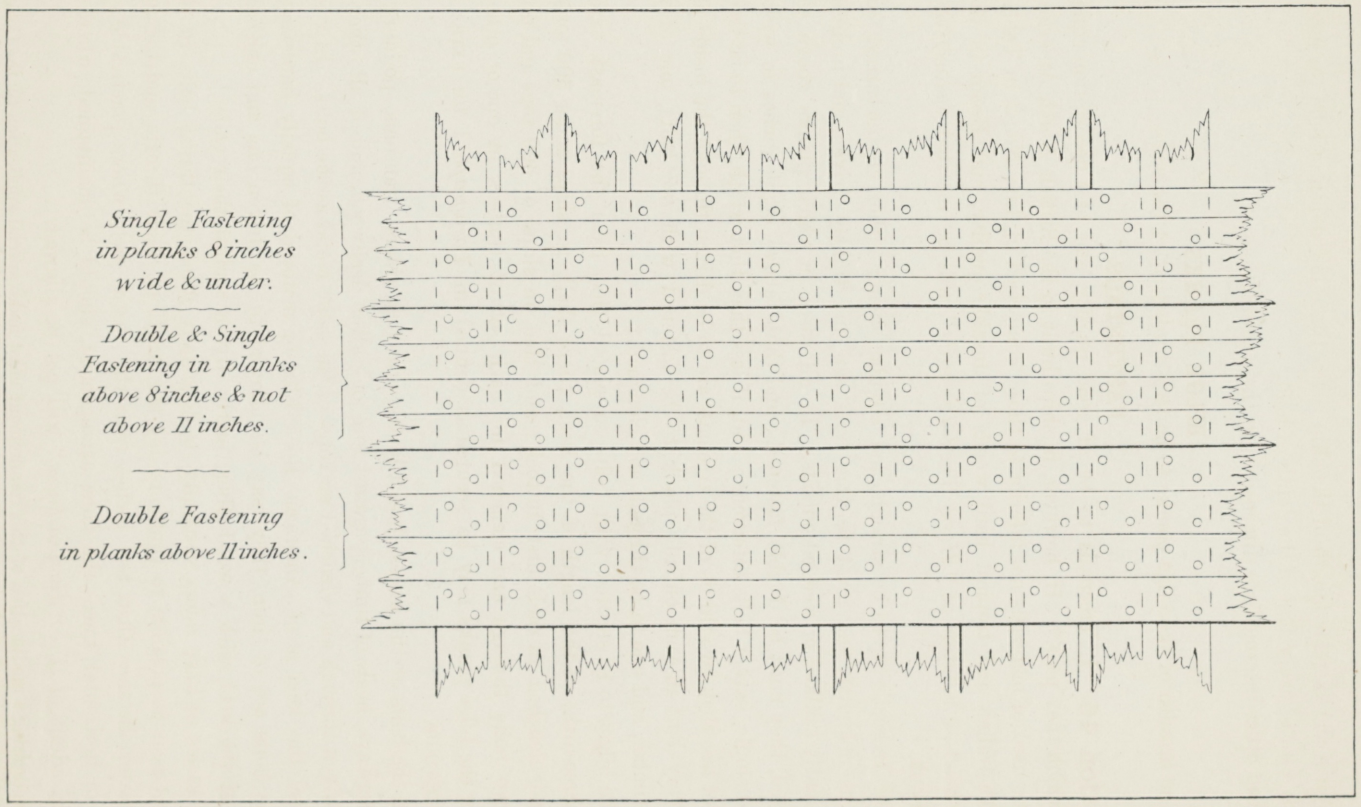
3. When the extreme length of the ship is eight times her depth of hold, the wales are to be in breadth $3\frac{1}{2}$ in. to every foot of the depth of hold.

## *SKETCH DESCRIPTIVE OF THE REQUIRED SHIFTING OF PLANK.*—*Section 44.* (*See also Section 39.*)




*The Sketch shews the principle on which the Butts should be arranged, so as to avoid* Stepping, *which is deemed bad Workmanship.*

SKETCH SHOWING THE PROPER ARRANGEMENT OF TREENAILS OR BOLTS_SECTION 46.



4. When the extreme length of the ship is ten times her depth of hold (or more), the wales are to be in breadth 4 in. to every foot of the depth of hold.

5. And other intermediate dimensions in these proportions.

### BILGE PLANKS.

6. The breadth of the bilge planks to be two-thirds that of the wales.

### FASTENINGS.

**Section 46.** 1. Treenails to be of good quality, and of a description equal to the best material through which they pass.* If, however, in ships built in the British North American Colonies, or of Fir, treenails be used of materials not inferior to those comprised in line No. 2 in Table A, including Locust and all Australian and tropical hard woods of durable quality, and Beech in the bottom not higher than floor-heads, a notation of "*Hard Wood Treenails*" will be inserted against the ship's name in the Register Book.

2. The treenails are to be straight and circular, being either engine-turned, compressed, or planed, not graincut or knotty, and must be free from sap and tightly driven, and in all cases the treenails are to be efficiently caulked or wedged outside. In all cases in which planks above eleven inches in width shall be used, they must be double fastened; and those above eight inches in width must be treenailed double and single, except bolts intervene; and, if less than that width, then to be treenailed single.

3. Not less than two-thirds of the treenails are to be driven through the inside planking, clamps, &c.

4. Every butt in each outside plank to be fastened with *two* bolts, one of which may be in the adjoining timber, and one to be through and clenched.†

5. The bilges to be secured with bolts so placed that from the foremast, extending a distance aft equal to three-fifths of the length of the keel, there shall, in ships under 300 tons, be at least one bolt through and clenched in each first futtock; and that in ships of 300 tons and upwards there shall be at least TWO bolts through and clenched for each set of timbers in one or other of the thick bilge strakes; or the bilge planks may be secured as defined in *Paragraph* 1 for EXTRA PERIOD ALLOWED FOR METAL FASTENINGS.

6. All the bolts of the knees, breast-hooks, crutches, riders, transoms, pointers, and keelsons, shelf-pieces, waterways, heels of timbers against fore and after deadwood, and of all other material fastenings, are to be driven through and clenched on rings of the same metal as the bolts. In vessels of 150 tons and under, where the keel is of American Rock Elm, or material of equally hard texture, and where the middle line bolts are of iron, they may be allowed to be driven one and one-half inch short of the underside of the keel, with a wood plug tightly driven against their ends.

7. In knees or knee riders vertically or diagonally fitted, the throat bolts in the side arms are to be placed as near as possible to (but not in) the angle of their throats, and the next bolt should not be at a greater distance than ten inches from the throat bolt, where practicable; also in the bolting of lodging or horizontal knees the same arrangement should be maintained, where the spacing of the timbers will admit of it. "*Jumped knees*" will not be allowed.

* Parties desiring a modification of this requirement must make special application to the Committee in each case.

† Where thick garboard strakes are used, they must be bolted horizontally through the keel and each other.

8. The up and down bolts in the knees to beams are not required to be through the deck, but whether clenched upon the beams, or upon the deck, they must be clenched on rings of the same metal as the bolts.

9. The two bolts, the nearest to the crowns of the pintles and braces of the rudder, are also to be through and clenched, those through the braces to be in the main piece of sternpost.

10. The limber strakes to be bolted at every alternate timber, the bilge planks at every third timber, and the shelves or clamps at every timber *in each strake.**

11. When the heels of the first futtocks meet at the middle line on the keel under the keelson (either with full moulding or with *butted* chocks) the through bolting of the limber strakes may be dispensed with.

12. When the lower deck or hold beam waterways, shelves, spirkettings, clamps and wood lodging-knees, the bilge planks, limber strakes, and wood hooks, crutches and pointers, are fastened with iron, the bolts may be either driven through and clenched on the timbers of the frame, or from the timbers of the frame and clenched inside (if iron lodging knees are fitted and fastened with iron, the bolts must be driven from the inside), provided that the in and out bolts of the hanging-knees to the hold or lower deck beams, and those of the knee riders, iron hooks, crutches, or pointers, where such are fitted, are of copper or yellow metal driven through and clenched on the outside plank; and also one bolt in each butt of the bottom planking from the keel to one-fifth the depth of hold below the upper side of the upper deck, and parallel thereto forward and aft, be driven through and clenched on the ceiling, to be of copper or yellow metal, and, in addition, all the short bolts within the same range to be of copper or yellow metal.

## EXTRA PERIOD ALLOWED FOR METAL FASTENINGS.

13. *Paragraph* 1.—An additional year will be allowed to Ships of the A character, either on original Classification or on Restoration under the Second Rule, if fastened externally with treenails, and with copper or yellow metal bolts, to the exclusion of iron, in the outside planking, keel, keelson, deadwood, stem and sternpost, also in the hanging knees and riders, hooks and crutches (the bolts of which must pass through the outside planking), from the lower part of the keel up to the height of one-fifth the midship depth of hold, set down below the upper side of the upper deck at the side, and parallel thereto forward and aft; above which all external bolt fastenings, and the fastenings of the deck, may be of iron, if properly galvanized. The bolts in the heels of timbers abutting against the dead-wood, forward and aft, must be of copper or yellow metal driven through and clenched on rings of the same metal; but the limber, bilge, *lower deck or hold beam*, shelf or clamp, and lodging-knee bolts, may be of plain iron, driven through, and clenched on the timbers of the frame, or from the timbers of the frame, and clenched inside. The whole of the remaining fastenings inside may be of plain iron. If iron lodging knees are fitted, their fastenings must be driven from the inside. The limber strakes to be bolted at every alternate timber, the bilge planks at every third timber, and the shelves or clamps at every timber in each strake.

14. In all cases through bolts must be clenched on rings of the same metal.

15. Vessels thus fastened will have the notation of cf. (copper fastened) recorded in the Register Book.

* Watercourses are to be properly formed at underside of all floors and futtocks at the limbers on each side of middle line, so as to allow water to reach the pumps freely.

16. *Paragraph* 2.—Two additional years will be allowed to ships of the A Character, either on original Classification or on Restoration under the Second Rule, if fastened externally with treenails, and with copper or yellow metal bolts or dumps, to the exclusion of iron, from the lower part of keel to the waterway inclusive, and the whole of the inside bolt fastenings, including fastenings of deck, frame bolts, and bolts in iron straps on timbers, and also the chain and preventer bolts, be of properly galvanized iron; but the bolts in heels of timbers abutting against deadwood, forward and aft, must be of copper or yellow metal driven through and clenched on rings of the same metal. The limber, bilge, *lower deck or hold beam*, shelf or clamp, and lodging-knee bolts, may be of properly galvanised iron if driven through and clenched on the timbers of the frame, or from the timbers of the frame and clenched inside. If iron lodging-knees are fitted, their fastenings must be driven from the inside, but the whole of the bolts in the hanging-knees, riders, hooks and crutches, must pass through the outside planking and be of copper or yellow metal. The limber strakes to be bolted at every alternate timber, the bilge planks at every third timber, and the shelves or clamps at every timber in each strake.

17. Vessels thus fastened will have the notation of CF. (Copper Fastened) recorded in the Register Book.

18. *Paragraph* 3.—Three additional years will be added on original Classification if, in lieu of treenails above the floor-heads, the whole of the planking is fastened with bolts of copper or yellow metal to the waterway inclusive, and the whole of the inside bolt fastenings, including fastenings of deck, frame bolts, and bolts in iron straps on timbers, and also the chain and preventer bolts, be of properly galvanized iron; but the bolts in heels of timbers abutting against deadwood, forward and aft, must be of copper or yellow metal *driven through and clenched on rings of the same metal.* The whole of the bolts in the hanging and lodging-knees, riders, hooks and crutches, must be through and clenched on the outside planking. In such cases of substitution the bolts must be in number the same as is already prescribed above for treenails; the proportion of through bolts must be at least two-thirds, and all the through bolts must be of malleable metal, and clenched on rings of the same metal inside.

19. The sizes of the copper or mixed metal bolts must be as under, viz. :—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| In ships of 150 tons | and under | 200 | tons | ... | ... | ... | $\frac{5}{8}$in. |
| 200 | ditto | 350 | „ | ... | ... | ... | $\frac{3}{4}$in. |
| 350 | ditto | 500 | „ | ... | ... | ... | $\frac{13}{16}$in. |
| 500 | ditto | 700 | „ | ... | ... | ... | $\frac{7}{8}$in. |
| 700 | ditto | 900 | „ | ... | ... | ... | $\frac{15}{16}$in. |
| 900 | and above | | | ... | ... | ... | 1in. |

Smaller sizes must not be used.

and the lengths of the short bolts not less than as follows, viz. :—

When used in plank of $2\frac{1}{2}$ inches, to be 7 inches long

3 „ 8 „

4 „ 10 „

5 „ 12 „

and so on in proportion for plank of other thicknesses. The sizes of the bolts required in the several parts must not be less than is shown in Table D.

20. Vessels thus fastened will have the notation of C.B. (Copper Bolts instead of Treenails) recorded in the Register Book.

21. In British North American or Colonial built ships, and all ships wherever built, the frames of which are composed of Fir in order to entitle them to the additional term proposed by these sections, Nos. 1, 2, and 3, the rule with reference to "Salting" (Section 37) must in all cases have been complied with originally, or during repair under the Second Rule for Restoration.

**Section 47.** In every case where the butt bolts are not through and clenched, One Year will be deducted from the period which would otherwise be assigned in the classification of the vessel.

## SHIPS BUILT UNDER A ROOF.

**Section 48.** Ships built under a substantial and efficient roof, kept in good repair, which shall project at each end beyond the length, and on each side beyond the breadth, a quantity equal to half the breadth of the vessel, shall have One Year added to the period prescribed, provided they shall have been surveyed whilst building, and shall have occupied a period of not less than twelve months in their construction, and in which no plank, except as follows, shall have been worked until the expiration of at least three months after the frame was completed, viz. :—not more than three strakes of bilge planks, and two strakes of outside plank in the way of each tier of beams, also the clamps inside, so that the beams may be put in their places.*

**Section 49.** The scantlings and dimensions for all sized vessels to be proportionately regulated, agreeably to Table B.

## SHIPS CLASSED 11 A.

**Section 50.** Ships surveyed while building, in which *all the materials required for a Twelve Years Ship shall have been used*, and most of the other requisites for that grade fulfilled, but which, from partial deficiencies, may not appear to be in all respects entitled to the full period, although superior to the description of a Ten Years' Ship, may be marked in the book thus, 11 A; thereby denoting that they are to remain on that grade *Eleven Years*, provided they be kept in a state of efficient repair.

## SHIPS CLASSED 10 A.

**Section 51.** Ships surveyed while building, in which every *alternate* set of timbers are frame-bolted together throughout their entire lengths, and the scantling and shifts of the timbers, the thickness and shifts of the planks, and size of fastenings may be the same as are required by the Rules, and the description of materials prescribed in Table A shall also have been used, but in which the frame is not so well squared as is required for Twelve Years' ships, but which shall be *in other respects* equal thereto, shall be marked 10 A; thereby denoting that they are to remain on that grade for *Ten Years*, provided they be kept in a state of efficient repair.

**Section 52.** 1. In all other cases, ships surveyed while building, and constructed of the materials of good quality, hereinafter shown in Table A, will be allowed the several terms of years respectively appointed, provided they be kept in a state of efficient repair.

* In ships not exceeding 400 tons, a relaxation of the period herein required may be allowed (but not exceeding four months) provided application be made to the Committee, who will appoint a Special Survey, and who will require a report of the date when the timber was felled, its condition after being sided and moulded and stacked for seasoning, and also when in frame.

## SHIPS NOT BUILT UNDER SURVEY.

2. All ships, not built under Survey, whether in the United Kingdom or abroad, for which a character may be claimed, must be placed in dry dock or laid on blocks in order that their bottoms may be seen and properly examined. They will also be required to have their timbers completely exposed for examination, by a plank or listing, as the Surveyor (who must be an exclusive officer of the Society) may direct, being taken out, either inside or outside, all fore and aft, on both sides, equal to one entire strake, at the first futtock-heads, and another between decks. A few treenails must likewise be driven out, so that the Surveyors, from actual inspection, may be satisfied whether or not they are of the quality and make prescribed by the Rules; and the same, being thus ascertained, shall be reported to the Committee, and a character assigned. (*See also* Section 20.)

3. If the ship be 400 tons and upwards, the Survey must be made by two Surveyors, and their report signed accordingly.

**Section 53.** 1. Ships built in the United Kingdom—or in Quebec; or St. John, New Brunswick, or Miramichi, and Northern Ports of New Brunswick, or in Prince Edward Island or built in Nova Scotia after 1864—and *not surveyed while building* by the Surveyors to this Society, and all ships, the Owners or Builders of which may have refused or declined to permit them to be surveyed at the several periods prescribed by the Rules, will have One Year deducted from the period which would otherwise have been assigned, in consequence of their not having been submitted to Survey during their construction.

2. In no case, however, will a higher grade than 10 A be assigned *for wood materials* to ships built in the United Kingdom which shall not have been surveyed while building.

## CONTINUATION OF SHIPS CLASSED A.

**Section 54.** 1. If on the termination of the period of original designation, or if, at any subsequent period not exceeding two thirds of the number of years assigned originally, or on Restoration (provided the last paragraph, Section 56, and 2nd and 3rd paragraphs, Section 57, be complied with), the Owner should wish to have his ship remain, or be replaced on the letter A, he is to send a written notice thereof to the Secretary, and the Committee shall then direct a Special Survey, as follows, to be held by not less than two competent persons to be appointed by the Committee, one of them to be a Surveyor, the exclusive officer of the Society.

2. The period assigned for Continuation will commence from the time of the expiration of the term assigned originally or which might have been assigned on the letter A, without regard to the date when the Survey for this purpose may subsequently have been held. This period may be either one-third or two-thirds the number of years assigned originally, or on Restoration, if the last paragraph, Section 56, or the 2nd and 3rd paragraphs of Section 57, be complied with, dependent on which of the following Surveys, designated Survey No. 1, and Survey No. 2, be complied with. (*See also* Section 52.)

3. Ships so Continued shall be distinguished in the Register Book by the number of years for which the character is extended being inserted separately under the number assigned on the original character, thereby denoting that the ship has been found on survey in such good and efficient order as to entitle her to be continued for the specified number of years.

4. But if during the last year of the period assigned originally, or on Restoration (when the Restoration is of such a character as to allow of Continuation—*see* last paragraph of Section 56 and 2nd and 3rd paragraphs of Section 57), the owner of the ship shall, in consequence of her being about to proceed on a distant foreign voyage, apply to have her specially surveyed for Continuation on the letter A, a Special Survey shall be held conformably with this Section.

5. Where such Continuation is assigned, the Half-time Survey as prescribed in Section 34 is to be held, and the vessel to be subject to an annual survey.

6. In cases of the repair of Ships for Continuation of the A Character, materials of a lower grade than those used in the original construction of the ship will be permitted to be used, but they will be noted in the Register Book. Should the materials thus used be not removed on Restoration, the term of Restoration will be reduced, the reduction being regulated by the Mixed Material Rule, Section 34.

7. If, at the termination of the period of Continuation assigned on the original class under Survey No. 2, the owner desires a *further* Continuation of the A Character, the vessel must be submitted to a Special Survey, designated Survey No. 3, when, if found or placed in good and efficient condition, she may be further Continued for a period of one-third the number of years assigned originally; such further Continuation to date from the expiration of the previous Continuation; and if at the end of the term thus assigned the requirements of the Half-time Survey, Section 34, be complied with, and the vessel be favourably reported upon by the Surveyors, she will be allowed to lapse to the character of A in Red (subject to annual Survey) until the expiration of a period of two-thirds the number of years originally assigned, dating from the completion of the Special Survey No. 3.

## SURVEY NO. 1.

8. The ship must be either placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

9. To be scraped or dubbed bright, from the light water-mark upwards, including the plankshеers and waterways, so as to expose the surface of the plank to view.*

10. The hold to be cleared, and proper stages to be made both inside and outside.

11. All air-courses and the limbers to be cleared.

12. The condition of the timbers of the frame to be further ascertained, by a *new* listing not less than four inches wide being *cut* out of the ceiling at each end of the hold, on each side, between the keelson and air-course under hold beam clamp, for one-fifth the entire length of the ship.

13. One treenail to be driven out from every alternate frame or fourth timber, between the upper

* If the ship has been sheathed with wood over felt, within a period of five years, and the plank from the light water-mark upwards shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained, and favourably reported upon by the Surveyors, the stripping from the light water-mark upwards may, on application to the Committee, be dispensed with, providing that the sheathing which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listings of sheathing be cut out at hood ends; and the planking, fastenings, and caulking so exposed, shall prove to be in good condition; but, whenever the sheathing is removed, the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

If the ship has been sheathed with metal within a period of two years, and it shall appear to the Surveyors that stripping from the light water-mark upwards may be dispensed with, the case will receive due consideration an application to the Committee.

edge of the wales and plankshеers, and one from every alternate frame or fourth timber, between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

14. Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

15. If the fastenings in the range of the lower deck be *of iron not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through bolted in these parts, as the Surveyors may direct.

16. All treenails, bolts, and listings, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

17. *Where the middle line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel, in each alternate frame, also through the stem, apron, sternpost, and deadwood.

18. All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

19. The condition of the oakum and caulking to be ascertained.

20. In the case of vessels allowed an additional year in classing for Salting, under Section 37, the state of the salting throughout such vessels is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

21. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

22. The cables, masts, spars, and general equipment to be attended to, as prescribed in Sections 72 to 76.

23. The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks, through which they pass, the plankshеers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

24. The ship to be efficiently repaired with suitable materials.

25. The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and efficient state, the Committee shall continue such ship on the letter A, for such further period as they may think fit, not exceeding, however, *one-third* of the number of years which had been assigned originally, or on Restoration. No Ship, however, can have a continuation of the A Character *after Restoration* unless the last paragraph, Section 56, or the 2nd and 3rd paragraphs of Section 57, be complied with.

26. Ships classed A for a less period than six years, will be allowed a Continuation of two years, provided that, in addition to the above requirements the Owner shall have removed a plank in each buttock.

27. Ships built in the British North American Colonies will have to comply with the Rules, Section 63.

28. If, however, at the time of the above Survey, or at any time during the term of Continuation, the ship be *diagonally* doubled according to Section 68; then, in the case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding 5 and under 12 years' grade will be allowed 3 years additional, and those built of 12 years' materials and upwards, 4 years additional; provided a strake all fore and aft at the upper edge of the doubling, or the plank sheer be removed.

## SURVEY NO. 2.

29. For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

30. All sheathing (wood or metal) to be entirely striped off the bottom, and elsewhere.*

31. All the outside planking from the light water-mark upwards, including the plank sheers and waterways, to be scraped or dubbed bright.

32. The hold to be cleared, and proper stages made both inside and outside.

33. All air-courses and the limbers to be cleared.

34. The condition of the timbers of the frame to be further ascertained by the removal of all the treenails in *one* strake in the topsides fore and aft on each side, and by the removal of *two* planks on each side above the wales (except in vessels of 200 tons or under, when the removal of *one* plank on each side will be deemed sufficient).

35. In addition, a plank to be removed in each bow and each buttock.

36. One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

37. If the *whole* of the treenails from the light water-mark upwards have to be renewed, the removal of a plank in each bow and buttock will be sufficient, provided the timbers in the treenail hole be examined, and found in good condition.

38. Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams, to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

* If the ship has been sheathed with wood over felt, within a period of five years, and the plank shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with, provided that the sheathing which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, astenings, and caulking so exposed, shall prove to be in good condition; but, whenever it is removed, the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

39. If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

40. *Where the middle line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

41. Plank, or *new* listing of ceiling of sufficient breadth (not less than 4 inches wide), at the discretion of the Surveyors, to be cut out of the ceiling in the range of the floor-heads, or at such height as may, in the judgment of the Surveyors, best expose the timbers of the frame to view, at each end of the hold on each side for one-fifth the entire length of the ship, and for the remaining three-fifths of the ship's length, the state of the timbers to be ascertained by driving out a treenail from every fourth timber in one or other of the strakes of bilge planking. If the Shipowner should prefer it, planking may be removed *outside* at each end of the ship in the range of the floor-heads.

42. In order to ascertain the condition of the upper deck beam ends, a strake of deck next the waterways on each side to be taken up except where it is covered by a poop or a forecastle; and where this exception arises the strake should be removed as far aft as the first beam within the poop, and as far forward as the first beam within the forecastle. On the decks below, as well as on the upper deck beyond the above limits, the plank need not be removed, provided the beams be tested by boring and sounding, and be found good.

43. All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition to be from such parts as the Surveyors may direct.

44. All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

45. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

46. The condition of the oakum and caulking to be ascertained.

47. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

48. The anchors, cables, masts, spars, and general equipment, to be attended to as prescribed in Sections 72 to 76.

49. The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks through which they pass; the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors and keelson; the keel, rudder, and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form the ship.

50. The ship to be efficiently repaired with suitable materials.

51. The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs

she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and thoroughly efficient state, the Committee shall Continue such ship on the letter A for such further period as they may think fit, not exceeding, however, *two-thirds* of the number of years which had been assigned originally or on Restoration. No ship, however, can have a Continuation of the A Character *after Restoration*, unless the last paragraph, Section 56, or the 2nd and 3rd paragraphs of Section 57, be complied with.

52. If, however, at the time of the above Survey, or at any time during the term of Continuation, the ship be *diagonally* doubled, and the other requirements be complied with, according to Section 68, then, in case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years' additional on account of such diagonal doubling; those built of materials exceeding the 5 and under 12 years' grade will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional.

53. If such extended term be given for the doubling, the materials used in the repairs must be equal in grade to those required in the original construction of the ship, or she will be liable to a reduced class regulated by the Mixed Material Rule, Section 34.

## SURVEY NO. 3.
## FURTHER CONTINUATION OF SHIPS CLASSED A.

54. For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

55. All sheathing (wood or metal) to be entirely stripped off the bottom and elsewhere.*

56. All the outside planking, from the light water-mark upwards, including the plankshеers and waterways, to be scraped or dubbed bright.

57. The hold to be cleared, and proper stages made both inside and outside.

58. All air-courses and the limbers to be cleared.

59. The condition of the timbers of the frame to be further ascertained by the removal of planking equal to one strake fore and aft on each side above the wales; and a short plank in each buttock. In addition, a strake of planking to be removed, or a new listing of sufficient breadth not less than four inches, all fore and aft on each side in the ceiling above the floor heads; or, if the Shipowner should prefer it, a strake of planking may be removed outside at the same height.

60. One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails and the timbers and planking in the treenail holes.

61. Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier

* If the ship has been sheathed in wood over felt, within a period of five years, and the plank shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with; provided that the sheathing which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, fastenings and caulking so exposed shall prove to be in good condition; but, whenever it is removed, the outside planking is to be scraped and dubbed bright, and examined as prescribed by the above Rule.

of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

62. If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

63. *Where the middle line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

64. In order to ascertain the condition of the upper deck beam ends, a strake of deck next the waterways on each side to be taken out, except where it is covered by a poop or a forecastle; and, where this exception arises, the strake should be removed as far aft as the first beam within the poop, and as far forward as the first beam within the forecastle. On the decks below, as well as on the upper deck beyond the above limits, the plank need not be removed, provided the beams be tested by boring and sounding, and be found good.

65. All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition to be from such parts as the Surveyors may direct.

66. All yellow metal bolts to be tested when practicable, to ascertain if any are broken.

67. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

68. The condition of the oakum and caulking to be ascertained.

69. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

70. The anchors, cables, masts, spars, and general equipment, to be attended to as prescribed in Sections 72 to 76.

71. The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks through which they pass, the planksheers, waterways and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms, the floors and keelson, the keel, rudder, and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

72. The ship to be efficiently repaired with suitable materials.

73. The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and thoroughly efficient state, the Committee shall Continue such ship on the letter A for such further period as she may be eligible, not exceeding, however, *one-third* of the number of years which had been assigned originally, such further Continuation to date from the expiration of the term of Continuation assigned under the Second Survey.

74. If, however, at the time of the above Survey, or at any time during the term of Continuation,

the ship be *diagonally* doubled, and the other requirements be complied with, according to Section 68 then, in case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding the 5 and under 12 years' grade will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional.

75. If such extended term be given for the doubling, the materials used in the repairs must be equal in grade to those required in the original construction of the ship, or she will be liable to a reduced class regulated by the Mixed Material Rule, Section 34.

## RESTORATION OF SHIPS TO THE CHARACTER A.

**Section 55.** 1. If at *any age* of a vessel the Owner be desirous to have his ship Restored to the A character, such Restoration will be granted for a period not exceeding *one-half* of the term originally assigned, the same to be calculated from the date of such repairs; provided that a Special Survey as hereafter described be held by two Surveyors, one of them to be an exclusive Officer of the Society, and that all repairs found necessary be completed to their satisfaction.

2. If, at the expiration of such Restoration, the Owner be desirous to have his ship again Restored, she must be subjected to the requirements of the second Rule for Restoration.

## REQUISITES FOR RESTORATION.—FIRST RULE.*

**Section 56.** 1. The ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

2. All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.

3. All the outside planking from the light water-mark upwards, including the waterways, poop and forecastle, planksheers, the stem, knight-heads and hawse-timbers, and the sternpost and rudder, where exposed; also the shelves, clamps, hold-beams, waterways, all inside planking, and the keelson to be scraped or dubbed bright.

4. The hold to be cleared, and proper stages made both inside and outside.

5. All air-courses and the limbers to be cleared. The condition of the timbers of the frame to be further ascertained by the removal of one strake of topside planking all fore and aft on each side.

6. In addition, a plank to be removed in each bow and each buttock.

7. In all cases the outside planks through which the chain and preventer bolts pass must be removed.

8. In flush-deck ships all the planksheer and spirketting to be removed, but in ships having a poop or top-gallant forecastle it will only be necessary to remove the planksheer and spirketting between these, and the mouldings in continuation of the planksheer forward and aft, or a portion of topside planking extending from the fore part of the poop aft, and from the after part of the top-gallant forecastle forward.

9. One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the planksheer, and one from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, also one to be driven out from every fourth timber for half the vessel's length amidships on each side at the bilge, and at such other parts of the vessel as the

* In the case of the Restoration of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.

Surveyors may direct, in order that the state of the treenails, and the timbers and planking in the treenail holes, may be ascertained.

10. Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams, to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

11. If the fastenings in the range of the lower deck be of *iron not through the outside planking*, one plank on each side is to be removed, so that the condition of these fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts as the Surveyors may direct.

12. *Where the middle-line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel, in each alternate frame also through the stem, apron, sternpost, and deadwood.

13. A strake of ceiling to be removed all fore and aft, in the range of the first futtock-heads, or at such height forward and aft as may, in the judgment of the Surveyors, best expose the timbers of the frame and chocks to view.

14. One plank of ceiling on each side at the floor-heads to be removed.

15. In order to ascertain the condition of the deck beam ends, a strake of deck next the main or inner waterway to be removed from each tier of beams, excepting that, in ships having a poop or a top-gallant forecastle, the upper deck need not be removed abaft the first beam within the poop, or before the first beam within the forecastle; provided the remainder of the upper deck beams under the poop and forecastle be tested by boring and sounding, and be found good.

16. All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

17. All yellow metal bolts to be tested, where practicable, to ascertain if any are broken.

18. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

19. The condition of the oakum and caulking to be ascertained.

20. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

21. The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

22. When in the state above described, the ship is to be submitted to a special survey and examination, at which the attention of the Surveyors is to be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the planks through which they pass; the waterways and beams so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost and transoms; the floors, keelson, and keel; the rudder and all its parts and hangings; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

23. If, after the above examination, the Owner should consent to take out all planks, timbers, beams, knees, waterways, fastenings, and other parts that may be found defective, or objected to, and replace them

with materials of the same species, or of equal quality to that required in vessels of two-thirds the number of years (by their timber material) of the ship's original construction, then such ships to be entitled to be Restored for a period not exceeding *one-half* the number of years originally assigned.

24. If, however, in addition to the above, or at any time during the term of Restoration, the ship be *diagonally* doubled, according to Section 68, then in the case of ships built of the 5 years' grade and under, 2 years additional will be allowed; if built of materials exceeding the 5 and under the 12 years grade, 3 years additional; and if of 12 years' material, 4 years additional will be allowed.*

25. Ships Restored, to be subject to annual survey, and also to a half-time survey, as prescribed in Section 34.

26. Ships of 300 tons or above, Restored according to the foregoing Rule, will not be allowed a Continuation of the Character A at the expiration of the Restoration, unless they be diagonally doubled as prescribed in Section 68. But if they be under 300 tons, and exceeding 20 years of age, to be allowed a Continuation, the bottom planking must either be doubled, as prescribed in Section 68, or else renewed for half the length amidships from the second futtock-heads to the keel, in addition to the other requirements of Section 54.

## SECOND RULE.

**Section 57.** 1. If, at any age of a vessel, the owner be desirous to have his ship Restored to the A character for a longer period than one-half her original classification, she must be subjected to the Special Survey hereafter described, to be held by two Surveyors, one of them to be an exclusive Officer of the Society, and all repairs found necessary must be completed to their satisfaction.

2. If the vessel be 300 tons or above, she must be diagonally doubled, as per Section 68, unless the whole of the planking from the keel to the height of the second futtock-heads be renewed,† when the doubling may be dispensed with.

3. But if she be under 300 tons, and exceeding twenty years of age, she must have the bottom planking renewed† for one-half the length amidships from the second futtock-heads to the keel, or be diagonally doubled, as per Section 68.

4. Vessels which have undergone this rule will be entitled to be Restored for a period not exceeding two-thirds the number of years originally assigned (exclusive of any period which might have been previously assigned for doubling), and in addition, if the vessel be at this time diagonally doubled, in accordance with the Rules, Section 68, the term prescribed for such doubling will be allowed.‡

5. When extensive repairs are effected under this rule, and a large proportion of low class materials has been removed and replaced by wood of a higher grade, then, if additional fastenings have been introduced, and the workmanship is of a superior description, the vessel will receive the same consideration with a view to assigning her an improved Class under the Mixed Material Rule, Section 34, as in ships on their original construction.

* *As regards ships which have already had a prolonged term for doubling*, see *Section* 68.

† If the whole of the ceiling from the bilges downwards has been removed, and the edges of the outside planking, and its general condition be found satisfactory, or if the outside planking shall have been recently renewed, the Committee will be prepared to give consideration to any application that may be made to them for a relaxation of the requirements above stated.

‡ In the case of Restoration of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.

## REQUISITES FOR RESTORATION.—SECOND RULE.*

**Section 58.** 1. The ship must be placed in dry dock or laid on blocks upon ways, so that the keel may be examined.

2. All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.

3. The hold to be cleared, and proper stages made both inside and outside.

4. All the outside planking from the lower part of the chocks at floor-heads upwards, the stem, knight-heads, hawse-timbers, sternpost, and rudder where exposed; also the shelves, clamps, bilge planks, ceiling and keelsons, to be scraped or dubbed bright.

5. All air-courses and the limbers to be cleared.

6. The upper deck waterways, spirketting, planksheers, sheerstrakes, and topside planks, through which the upper deck shelf-lodging-knee and waterway bolts pass, to be removed.

7. Two planks in each bow and each buttock to be removed.

8. In all cases, the outside planks through which the chain and preventer bolts pass must be removed.

9. If the bolts in the range of the lower deck be *iron*, the outside planks through which they pass must be removed.

10. One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the planksheer, and one from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, also one to be driven out from every fourth timber, for half the vessel's length amidships on each side at the bilge, and at such other parts of the vessel as the Surveyors may direct, in order that the state of the treenails and the timbers and planking in the treenail holes may be ascertained.

11. If the fastenings in the range of the lower deck be of *iron, not through the outside planking*, one plank on each side is to be removed, so that the condition of these fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts as the Surveyors may direct.

12. *Where the middle line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keels in each alternate frame, also through the stem, apron, sternpost, and deadwood.

13. Two strakes of ceiling in the range of the first futtock-heads, and one strake in the range of the floorheads, to be removed on each side all fore and aft.

14. The strake of upper deck plank next the hatchways to be removed all fore and aft.

15. A strake of deck next the waterway or spirketting, on the hold or lower deck beams, to be removed.

16. All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

17. All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

18. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary the salt is to be renewed.

* If the vessel be *Salted* in accordance with Section 37 during repairs under the Second Rule for Restoration, she will be allowed the advantage of the Rule for Salting.

19. The condition of the oakum and caulking to be ascertained.

20. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

21. The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

22. When in the state above described, the ship to be submitted to a special survey and examination, at which the attention of the Surveyors is to be particularly directed to the state of the upper deck and comings, the upper and lower deck binding bolts, whether of iron or copper, and the planks through which they pass; the beams, stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, innerpost, and transoms; the floors, keelson and keel; the rudder and all its parts and hangings; the planking outside and inside and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

23. If, after the above examination, the Owner should consent to take out all planks, timbers, beams, knees, fastenings, and other parts that may be found defective, or objected to, and replace them with materials of the same species or of equal quality *to that required in vessels of two-thirds the number of years (by their timber material) of the ship's original construction*, and she be *diagonally doubled* as per Section 68, *or planking renewed as required by Section* 57, then she will be entitled to be restored for a period not exceeding two-thirds the number of years assigned originally, and the term allowed for doubling, viz., 2 years additional if built of wood materials of the five years' grade and under; 3 years additional, if built of materials exceeding the 5 years' and under 12 years' grade; and 4 years additional, if built of 12 years' material or above.

24. Ships thus Restored to be subject to annual survey, and to the half-time survey, as prescribed in Section 34.

## CONTINUATION ON RESTORATION.

**Section 59.** 1. Ships which have been doubled when *Restored* (or in which the requirements of the last paragraph, Section 56, or the second and third paragraphs of Section 57, have been complied with) shall be entitled to Continuation, subject to the same conditions of survey and examination as are prescribed for ships proposed to be Continued at the expiration of the period first assigned to them (Section 54); but, in like manner, the term of such extended Continuation shall be limited to a period not exceeding one-third or two-thirds of the number of years for which the ships may respectively have been *Restored* exclusive of time allowed for doubling), without any reference whatever to the period originally assigned to them.

## EXPIRATION OF CHARACTER.

2. At the termination of the several periods assigned to ships for remaining on the Character A, or A in Red, they will have the word "*Expired*" inserted against them; and, if not surveyed prior to the reprinting of the Register Book, they will appear without any character.*

* The terms of years assigned to ships on the Character A, launched *previously to the 1st July*, 1859, also of ships launched during the *first* six months of the years 1860, 1861, 1862, and 1863, will expire on the 31st December of the last year of the periods assigned to them respectively.

The terms assigned to ships launched during the *last* six months of the years 1859, 1860, 1861, and 1862, will expire on the 30th June next after the last year of the periods assigned to them respectively.

In the case of ships launched on and after the 1st July, 1863, the period originally assigned to them on the A character, will in every case *date from the month* in which the vessel may be launched, and will expire at the end of the corresponding month in the year at which the period assigned terminates.

3. But if, during the *last year* of the period assigned to them, the Owners of a ship shall, in consequence of her being about to proceed on a distant foreign voyage, apply to have her surveyed for Continuation on the letter A, or for the Character A in Red, a special survey shall be held conformably to the Rules, Section 54 or 60, as the case may be; and if from the report of such Special Survey, the ship shall appear to be in all respects in a sound and efficient state, such as is required by those Rules, the Committee shall, from the period at which the ship's Character would terminate, continue on the letter A, or will assign to her the Character A in Red in accordance with the Rules referred to.

## SHIPS CLASSED A, IN RED.

**Section 60.** 1. Ships found on survey to be of a superior description, being fit for the safe conveyance of dry and perishable goods to and from all parts of the world, subject to the following conditions, shall be classed A in Red, as the Second description of the First class.

2. In all cases in which the Owner may claim this character, the ship must undergo a special survey by two Surveyors (to be appointed in every instance by the Committee), one of whom shall be an exclusive Officer of the Society. (*See* also Section 52 for Ships not built under Survey.)

3. Then if the following Survey, designated Survey No. 1, be complied with within twelve months of the expiration of the Character A, either on original Classification, Continuation, or Restoration, one-third of the number of years assigned originally, or such as might have been assigned, will be granted from the date of such Survey; *but, if this Survey be not complied with within the above stated time, the period named will commence from the expiration of the original Classification, Continuation, or Restoration.*

4. *If after the expiration of the period assigned, or which might have been assigned, under the* FIRST *Survey, the character* A *in red be sought, the following Survey, designated No.* 2, *must be complied with, when a period of two-thirds the number of years assigned originally, or such as might have been assigned, will be granted from the date of such Survey.*

5. *The character* A *in red for a period of two-thirds the number of years originally assigned may, however, be obtained at* ANY *time, provided the requirements of Survey No.* 2 *be complied with.*

6. In the repair of vessels for the above character, no materials may be used of a description inferior to those allowed in new ships for the six years' grade, except in the case of vessels originally classed for a shorter period than six years, when materials equal to those used in the original construction will be permitted.

## FIRST SURVEY FOR A, IN RED.

7. The ship must either be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

8. To be scraped or dubbed bright from the light water-mark upwards, including the plank sheers and waterways, so as to expose the surface of the plank to view.*

* If the ship has been sheathed with wood over felt within a period of five years, and the plank from the light water-mark upwards shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained, and favourably reported upon by the Surveyors, the stripping from the light water-mark upwards may, on application to the Committee, be dispensed with, provided the sheathing which covers the raft-ports and binding-bolts, and a strake of sheathing all fore and aft on each side under the wales be removed, and listings of sheathing be cut out at hood ends, and the planking, fastenings, and caulking so exposed shall prove to be in good condition; but, whenever the sheathing is removed, the outside planking is to be scraped or dubbed bright and examined as prescribed by the above Rules.

If the ship has been sheathed with metal within a period of two years, and it shall appear to the Surveyors that stripping from the light water-mark upwards may be dispensed with, the case will receive due consideration on application to the Committee.

9. The hold to be cleared, and proper stages to be made both inside and outside.

10. All air-courses and the limbers to be cleared.

11. The condition of the timbers of the frame to be further ascertained by a *new* listing not less than 4 inches wide, being *cut* out of the ceiling at each end of the hold on each side, between the keelson and air-course under the hold-beam clamp, for one-fifth the entire length of the ship.

12. One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the planksheers, and one from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers, and planking in the treenail holes.

13. Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

14. If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

15. All treenails, bolts, and listings, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

16. *Where the middle line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

17. All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

18. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is be ascertained and reported upon, and, if necessary, the salt is to be renewed.

19. The condition of the oakum and calking to be ascertained.

20. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

21. The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

22. The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings; the upper and lower deck bolts, whether of iron or copper, and the planks through which they pass; the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass; the planking outside and inside and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

23. The ship to be efficiently repaired with suitable materials.

24. The term for which a vessel may be assigned the Character A in Red, upon a compliance with the foregoing requirements, will not exceed one-third the number of years of that assigned originally, or

such as might have been assigned, subject to the usual annual survey, and also to the half-time survey, as prescribed in Section 34.

25. If, however, in addition to the above, the ship be *diagonally* doubled according to Section 68, then, in the case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding the 5 and under the 12 years' grade, will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional,* provided a strake all fore and aft at the upper edge of the doubling, or the plank-sheers be removed.

## SECOND SURVEY FOR A, IN RED.

26. For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined. (*See also* Section 52 for ships not built under Survey.)

27. All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.†

28. All the outside planking, from the light water-mark upwards, including the plank-sheers and waterways, to be scraped or dubbed bright.

29. The hold to be cleared, and proper stages made both inside and outside.

30. All air-courses and the limbers to be cleared.

31. The condition of the timbers of the frame to be further ascertained by the removal of all the treenails in one strake in the topsides fore and aft, on each side, and by the removal of two planks on each side above the wales, except in vessels of 200 tons, or under, when the removal of *one* plank on each side will be deemed sufficient.

32. In addition, a plank to be removed in each bow and each buttock.

33. One treenail to be driven out from every alternate frame or fourth timber, between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

34. If the whole of the treenails from the light water-mark upwards have to be renewed, the removal of a plank in each bow and buttock will be sufficient, provided the timbers in the treenail holes be examined and found in good condition.

35. Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

36. If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they

* *In the case of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.*

† If the ship has been sheathed with wood over felt, within a period of five years, and the plank shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with; provided that the sheathing, which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, fastenings, and caulking so exposed shall prove to be in good condition; but, whenever it is removed the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

37. *Where the middle-line bolts are of iron,* their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

38. Plank, or a *new* listing of ceiling, of sufficient breadth (not less than four inches wide), at the discretion of the Surveyor, to be cut out of the ceiling in the range of the floor-heads, or at such height as may in the judgment of the Surveyors best expose the timbers of the frame to view, at each end of the hold for one-fifth the entire length of the ship, and for the remaining three-fifths of the ship's length the state of the timbers to be ascertained by driving out a treenail from every fourth timber in one or other of the strakes of the bilge planking. If the Shipowner should prefer it, planking may be removed *outside,* at each end of the ship, in the range of the floor-heads.

39. In order to ascertain the condition of the upper deck beam ends, a strake of deck next the waterways on each side to be taken out, except where it is covered by a poop, or a forecastle, and where this exception arises the strake should be removed as far aft as the first beam within the poop, and as far forward as the first beam within the forecastle. On the decks below, as well as on the upper deck beyond the above limits, the plank need not be removed, provided the beams be tested by boring and sounding and be found good.

40. All treenails, bolts, listings, and planking removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

41. All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

42. In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

43. The condition of the oakum and caulking to be ascertained.

44. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

45. The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

46. The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings; the upper and lower deck bolts, whether of iron or copper, and the planks through which they pass; the plankshеers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbres, knight-heads, breast-hooks, sternposts, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass, the planking outside and inside, and treenails, the frame and inner surface of the outside planking, where they can be seen, and the sheer and general form of the ship.

47. The ship to be efficiently repaired with suitable materials.

48. To entitled them to continue this Character, such ships will be required, in addition to the usual annual survey, to undergo the half-time survey as prescribed in Section 34, and to undergo a special re-survey as prescribed above, within a period (from the date of the last special re-survey) not exceeding *two-thirds* of the several terms of years originally assigned to them, or earlier, if, in the judgment of the Surveyors, upon a careful examination of the ship, the same shall appear to them to be necessary.

49. If, however, in addition to the above, the ship be *diagonally* doubled, and the other requirements be complied with, according to Section 68, then, in case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding the 5 and under the 12 years' grade, will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional.*

## SHIPS CLASSED Æ.

**Section 61.** 1. Ships that have passed the prescribed age for the A Character, but have not undergone the repairs which would have entitled them to be Continued or Restored; or having been Continued or Restored, or classed A in Red, and the additional period thus assigned expired, and also such ships as have never had an original character, which shall be found on survey fit for the conveyance of dry and perishable goods on *shorter voyages*, and for the conveyance of cargoes not in their nature subject to sea-damage *on any voyage*, shall be distinguished by the diphthong Æ, upon compliance with the undermentioned Survey. (*See* also Section 52 for Ships not built under Survey.)

### Survey.

2. The ship to be placed on blocks, so that the keel and bottom may be seen and properly examined and the caulking tested.

3. The hold to be cleared and proper stages made both inside and outside.

4. The limbers and all air-courses to be cleared.

5. A listing to be cut out of the ceiling, not less than four inches wide, in the range of the floor-heads or at such height as may, in the judgment of the Surveyors, best expose the timbers of the frame to view, at each end of the hold on each side for one-fifth the extreme length of the vessel.

6. The outside planking to be scraped bright where the Surveyors may consider it to be necessary from any apparent defect.

7. Bolts of lower deck (if of iron) in number not less than six on each side, and treenails in number not less than twelve on each side, to be driven out at various parts of the ship.

8. The attention of the Surveyors is to be then particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, *whether of iron or copper*, and the outside planks through which they pass, and to all other parts of the ships, so far as they can be examined.

9. The windlass to be unhung and its wood lining sufficiently stripped for examination; and the chain cables to be removed from the lockers and ranged, and, with the anchors, masts, spars, and general equipment, examined so as to be satisfactorily reported upon.

10. *Where the middle-line bolts are of iron*, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, sternpost, and deadwood.

11. If the Æ Character be then assigned, it shall be continued, subject to an annual survey for a period not exceeding four years, at the expiration of which time the Character will be discontinued unless the vessel be again submitted to a similar Special Survey.†

* In the case of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.

† For doubling of ships of the above Class, *see* Section 68.

## BRITISH NORTH AMERICA AND ALL FIR SHIPS.*

**Section 62.** 1. Ships built in the British North American Colonies, and all ships wherever built, the frames of which are composed of *Fir*, of 400 tons and above, shall, in order to entitle them to be classed in the Register Book of the Society, be secured in their bilges by the application of iron knee riders, or hanging-knees and riders to cover the joints of the floor and futtock-heads, to extend from the height of the hold beams to the floors so as to receive not less than two bolts in a substantial part of the floors.

2. The number of iron knees and riders to be not less than one of each to every hold or lower deck beam on each side. The knees to be connected with riders or not, at the option or convenience of the Owners, but if not so connected, the side arms of the knees are to be of the length and to be fastened as prescribed in Table F. "*Jumped knees*" will not be allowed.

3. The number of knees to each deck, and of riders, also their dimensions, and number of bolts, are fully explained in Table F.

4. All ships built in the Colonies will be considered as "iron fastened" in their centre lines, unless it shall be satisfactorily shown to the contrary, either by the exposure of some of the bolts or by a certificate to be produced from the Builders.

5. Ships which proceed to sea *without being fastened with the iron knees and riders prescribed by the Rules*,† *will have One Year deducted* from the period to which they would otherwise be entitled to be classed in the Register Book.

## BRITISH NORTH AMERICAN BUILT SHIPS.

**Section 63.** 1. All British North American built ships, which have gone, or may go off the List of Ships of the A character, or which may be of an age exceeding the period for which they might have had claims to be put upon that grade (whether classed or not), shall, as from time to time they come under examination, be subjected to a careful Survey, to be made by one of the Surveyors to this Society;—and no further Character shall be assigned them unless a Survey shall be held as follows; either by removing planking *outside*, equal in breadth to an entire strake for one-fifth the length of the vessel forward and aft on both sides, or by cutting listings *inside* five inches wide to the same extent in the fore and aft bodies in line with the upper turn of bilges, or at such height as may, in the judgment of the Surveyors, best expose the timbers of the frame to view, and for the remaining three-fifths of the vessel amidships the state of the timbers to be ascertained by driving out a treenail in every fourth timber in one or other strake of bilge planking. A special report of the state of these timbers, and of the general state and condition of the upper deck fastenings, waterways, spirketting, planksheers, topsides, upper deck with its appendages, lower deck fastenings, wales, counter, plank and treenails outside to the water's edge, rudder, windlass and capstan, beams and breast-hooks, shall then be transmitted by the Surveyor to the Committee; and on the receipt of such report the character shall be assigned.

2. *If, in addition to the requirements contained in Section* 61, *the above Survey be complied with and the Æ Character be assigned, it shall be Continued, subject to an annual Survey, for a period not exceeding four years, at the expiration of which time the Character will be discontinued unless the vessel be again submitted to a similar Special Survey.*

* *See also* Section 39, paragraph 5.

† This applies not only to British North American ships, but to all wooden vessels.

*Extract from the Rules, Section 32.*

**TONNAGE FOR REGULATING THE SCANTLINGS & EQUIPMENT (AS REGARDS ANCHORS, CHAINS, &c.) OF WOOD & COMPOSITE VESSELS.**

In flush-decked vessels having either one, two, or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull, and also the equipment of the vessel, as regards anchors, chains, warps, &c.

In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, or awning-deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power*, is to regulate the equipment.

But in vessels where the tonnage of the erections above the tonnage deck is less than that allowed for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment.

No. 304.

## LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

### CHAIN CABLES.

**TESTING TO BREAKING STRAIN.**

"Chains tested under the Chain Cable and Anchor Act of 1864, at a Machine recognised by the Committee, will be accepted for any Vessel built, commenced, or contracted for *prior* to the 1st July, 1872; and all Vessels built, commenced, or contracted for *after* the 30th June, 1872, will be required to be supplied with Chains tested in conformity with the requirements of the New Act."

By order of the Committee,

BERNARD WAYMOUTH,
*Secretary.*

2, *White Lion Court, Cornhill, London, E.C.*
*1st January*, 1873.

### *(c)* STEEL WIRE TOWLINES, HAWSERS AND WARPS.

*(c)* When steel wire towlines, hawsers, or warps are adopted, a short length of each of the wires composing the towline, &c., will be required, after being galvanized, to withstand a tensile stress equivalent to that set forth in Table 22, and the aggregate strength of the wires must not be less than ten per cent. in excess of that stress.

Each wire will be required to be capable of being twisted around itself not less than eight times, and of being untwisted and straightened without breaking.

Each manufacturer to be required to provide on his premises machines suitable for satisfactorily making the foregoing tests, and the works to be at all times open to the inspection of the Society's Surveyors, who are to be empowered to retest any hawser or towline for which a certificate has been issued by the manufacturer.

Printed Forms of Certificates, approved by the Committee, to be given by the Manufacturers of Steel Wire Hawsers, will be supplied to them upon application to the Secretary.

20*th December*, 1883.

N.B.—The Italic letters preceding the Equipment numbers correspond with letters printed in the thirteenth column of the page of the Register Book to indicate the Equipment numbers of vessels per this Table.

# No. 22.

# CHAINS AND ANCHORS FOR *SAILING* VESSELS.

(*For Steam Vessels see other side.*)

Minimum Weights of Anchors, ex. Stock; Sizes and Lengths of Chains, and the proof strain to which they are to be tested per Chain Cables and Anchors Acts. The Anchors, and the links of the Chains to be of unexceptionable form and proportions. Also Sizes and Lengths of Towlines, Hawsers and Warps.

| Numbers for *Iron Vessels, See Foot Note (a)* | Ship's Tonnage | Anchors *(c)* Number. Bowers. | Stream. | Kedges. | Anchors *(c)* Weight. Bowers. *(b)* Ex. Stock. | Test. * | Collective Weights. | Ex. Stock. Stream. | Test. * | Kedge. | Test. * | 2nd Kdg | Test. * | Stud-Chain Cables. *(c)* *(d)* Minimum Size. | Proved to Admiralty Test. | Breaking Test. | Length. | Ship's Tonnage | Numbers for Iron Vessels. *See Foot Note (a)* | Stream, Chain or Steel Wire. Chain. *(c)* | Steel Wire. Size. | Steel Wire. Breaking Test. | Towline: Hemp or Steel Wire *(c)* Hemp. | Steel Wire. Size. | Steel Wire. Breaking Test. | Hawsers and Warps. 90 fathms of each |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tons. | | | | Cwts. | Tons. | Cwts. | Cwts. | Tons. | Cwts. | Tons. | Cwts | Tons. | Inches. | Tons. | Tons. | Fathoms. | Tons. | | F'thms | Inch. | Inch. | Tons. | F'thms | Inch. | Inch. | Tons. | Inch. | Inch. |
| *a* 1900 | 50 | 2 | 1 | 1 | 3½ | 5 1/8 | 7 | ¾ | — | ½ | — | — | — | 1 1/8 | 8 1/10 | 12¾ | 120 | 50 | *a* 1900 | 45 | 1/16 | | | 75 | 5 | | | 3 | — |
| *b* 2500 | 75 | 2 | 1 | 1 | 4½ | 6 1/8 | 8½ | 1½ | — | ½ | — | — | — | 1 3/8 | 10½ | 15⅛ | 120 | 75 | *b* 2500 | 45 | 1/16 | | | 75 | 5½ | | | 3 | — |
| *c* 3100 | 100 | 2 | 1 | 1 | 5 | 7 7/10 | 10 | 1½ | 3 1/8 | ¾ | — | — | — | 1 3/8 | 11¼ | 17 1/10 | 135 | 100 | *c* 3100 | 45 | 1/16 | | | 75 | 5½ | | | 3 | — |
| *d* 3650 | 125 | 2 | 1 | 1 | 5¾ | 8 | 11½ | 1½ | 3 1/8 | ¾ | — | — | — | 1 4/8 | 13¾ | 20⅛ | 165 | 125 | *d* 3650 | 45 | 1/16 | | | 75 | 6 | | | 3½ | — |
| *e* 4200 | 150 | 2 | 1 | 1 | 6½ | 8 1/8 | 13 | 2 | 4 1/8 | 1 | — | — | — | 1 5/8 | 15 1/10 | 23 7/10 | 165 | 150 | *e* 4200 | 45 | 1/16 | 2 | 7 | 75 | 6½ | | | 4 | — |
| *f* 4700 | 175 | 2 | 1 | 1 | 7¼ | 9 9/10 | 14½ | 2¼ | 4 1/8 | 1 | — | — | — | 1 | 18 | 27 | 165 | 175 | *f* 4700 | 45 | 1/16 | 2 | 7 | 75 | 6½ | | | 4 | — |
| *g* 5150 | 200 | 3 | 1 | 1 | 8¼ | 10 7/10 | 23½ | 2½ | 5 | 1¼ | — | — | — | 1 1/16 | 20 1/10 | 30 1/10 | 165 | 200 | *g* 5150 | 45 | 1/16 | 2¼ | 9½ | 75 | 7 | | | 4 | — |
| *h* 6000 | 250 | 3 | 1 | 2 | 10 | 12 | 28½ | 3¾ | 6 3/10 | 1¾ | 4 4/10 | ¾ | — | 1 1/8 | 22¾ | 34⅛ | 195 | 250 | *h* 6000 | 45 | 1/16 | 2½ | 9½ | 75 | 7½ | | | 5 | — |
| *i* 6800 | 300 | 3 | 1 | 2 | 12 | 13 7/10 | 34½ | 4 | 6 7/10 | 2 | 4 1/8 | 1 | — | 1 1/8 | 25¾ | 38 | 195 | 300 | *i* 6800 | 60 | 1/16 | 2¾ | 15½ | 75 | 8 | | | 5½ | — |
| *j* 7550 | 350 | 3 | 1 | 2 | 13½ | 15 3/10 | 38½ | 4¾ | 7 3/10 | 2½ | 5 | 1¼ | — | 1 1/16 | 28½ | 42⅛ | 210 | 350 | *j* 7550 | 60 | 1/16 | 2¾ | 15½ | 75 | 8 | | | 5½ | — |
| *k* 8250 | 400 | 3 | 1 | 2 | 15¼ | 16 1/10 | 43½ | 5¼ | 7 1/10 | 2½ | 5 | 1½ | 3 1/8 | 1 1/16 | 31 | 46½ | 210 | 400 | *k* 8250 | 60 | 1/16 | 2¾ | 15½ | 75 | 8½ | | | 6 | — |
| *l* 8900 | 450 | 3 | 1 | 2 | 16¾ | 18 | 47¾ | 5½ | 7 1/10 | 2¾ | 5 3/10 | 1½ | 3 1/8 | 1 1/16 | 34 | 51 | 240 | 450 | *l* 8900 | 60 | 1/16 | 2¾ | 15½ | 75 | 9 | | | 6½ | — |
| *m* 9600 | 500 | 3 | 1 | 2 | 18 | 19 | 51½ | 6½ | 8 1/10 | 3½ | 5 1/10 | 1½ | 3 1/8 | 1 1/16 | 37⅛ | 55¾ | 240 | 500 | *m* 9600 | 60 | 1/16 | 3 | 18 | 75 | 9½ | | | 7 | — |
| *n* 10800 | 600 | 3 | 1 | 2 | 21 | 21 1/8 | 60 | 7¼ | 9 2/10 | 3½ | 5 1/10 | 1¾ | 4 3/10 | 1 1/16 | 40 1/10 | 58 1/10 | 240 | 600 | *n* 10800 | 60 | 1/16 | 3 | 18 | 90 | 10 | 3¼ | 22 | 7 | 4 |
| *o* 12000 | 700 | 3 | 1 | 2 | 23½ | 23 1/10 | 67 | 8 | 10 3/10 | 4 | 6 7/10 | 2 | 4 1/10 | 1 1/8 | 43 1/10 | 61 3/10 | 270 | 700 | *o* 12000 | 60 | 1/16 | 3½ | 22 | 90 | 10 | 3½ | 22 | 8 | 5 |
| *p* 13200 | 800 | 3 | 1 | 2 | 25½ | 25 3/10 | 72¾ | 8½ | 10 1/10 | 4½ | 6 1/10 | 2¼ | 4 1/10 | 1 1/16 | 47 1/10 | 66 1/10 | 270 | 800 | *p* 13200 | 75 | 1/16 | 3½ | 22 | 90 | 10 | 3¼ | 22 | 8 | 5 |
| *q* 14400 | 900 | 3 | 1 | 2 | 27¾ | 26 1/8 | 79 | 8¾ | 10 7/10 | 4½ | 6 7/10 | 2¼ | 4 1/8 | 1 1/16 | 51½ | 71¾ | 270 | 900 | *q* 14400 | 75 | 1/16 | 3½ | 26 | 90 | 10½ | 3¼ | 22 | 9 | 5½ |
| *r* 15500 | 1000 | 3 | 1 | 2 | 30 | 28 1/8 | 85½ | 9½ | 11 1/10 | 4¾ | 7 3/10 | 2½ | 5 | 1 1/8 | 55½ | 77½ | 270 | 1000 | *r* 15500 | 75 | 1/16 | 3½ | 26 | 90 | 10½ | 3¼ | 22 | 9 | 5½ |
| *s* 17600 | 1200 | 3 | 1 | 2 | 32 | 30 3/10 | 91¼ | 10¼ | 12 3/10 | 5¼ | 7 7/10 | 2½ | 5 | 1 1/8 | 59¼ | 82¼ | 270 | 1200 | *s* 17600 | 75 | 1 | 3¾ | 29 | 90 | 11 | 3½ | 26 | 9½ | 6 |
| *t* 19600 | 1400 | 3 | 1 | 2 | 34 | 31 1/8 | 97 | 10¾ | 12 7/10 | 5½ | 7 7/10 | 2½ | 5 | 1 1/8 | 63¼ | 88 1/10 | 270 | 1400 | *t* 19600 | 75 | 1 | 3¾ | 29 | 90 | 11 | 3½ | 26 | 10 | 6 |
| *u* 21600 | 1600 | 3 | 1 | 2 | 36½ | 33 3/10 | 104 | 11¼ | 13 3/10 | 5½ | 7 7/10 | 2¾ | 5 3/10 | 1 1/8 | 67 1/10 | 94 1/10 | 270 | 1600 | *u* 21600 | 75 | 1 1/16 | 4 | 33 | 90 | 11 | 3½ | 26 | 10½ | 6½ |
| *v* 23400 | 1800 | 3 | 1 | 2 | 38 | 34 1/10 | 108¼ | 11½ | 13 7/10 | 5¾ | 8 | 2¾ | 5 3/10 | 2 | 72 | 100 1/10 | 270 | 1800 | *v* 23400 | 75 | 1 1/16 | 4 | 33 | 90 | 12 | 4 | 33 | 11 | 7 |
| *w* 25100 | 2000 | 3 | 1 | 2 | 40 | 35 1/10 | 114 | 12 | 13 1/10 | 6 | 8 1/10 | 3 | 5 1/10 | 2 1/16 | 76 1/10 | 107 1/10 | 270 | 2000 | *w* 25100 | 100 | 1 1/8 | 4¼ | 35 | 90 | 12 | 4 | 33 | 11 | 7 |
| *x* 29400 | 2500 | 3 | 1 | 2 | 42 | 37 3/10 | 119¾ | 13½ | 15 3/10 | 6¾ | 9 | 3½ | 5 1/8 | 2 1/8 | 86¼ | 120 1/10 | 300 | 2500 | *x* 29400 | 120 | 1 1/8 | 4¼ | 35 | 90 | 13 | 4½ | 39 | 12 | 8 |
| *y* 33400 | 3000 | 3 | 1 | 2 | 45 | 39 3/10 | 128¼ | 15½ | 16 1/10 | 7½ | 9 1/10 | 3¾ | 6 3/10 | 2 1/16 | 96¼ | 134⅜ | 300 | 3000 | *y* 33400 | 120 | 1 3/16 | 4½ | 39 | 90 | 13 | 4½ | 39 | 12 | 8 |

*(a)* By Section 39 of the Rules for the Building and Classification of *Iron Ships*, it is provided that "The equipment is to be regulated by the *Number* produced by the sum of the measurements of the half moulded breadth of the vessel amidships, her depth from the upper part of keel to the top of the upper-deck beams and the girth of her half midship section to the same height, multiplied by her length, for a one, two, and three-decked vessel, and for a spar-decked vessel."

For a vessel with a poop, topgallant forecastle, or a raised quarter-deck, the equipment number to be increased *one-fifteenth* beyond that which it would be if she were flush-decked.

*(b)* In order to meet the requirements of different trades, the weights of Anchors as given in the above Table may be modified as under:—

Where two Bower Anchors only are required, ne of them may be 7½ per cent. lighter than the weight set forth above, provided the collective weight of the two Anchors is e ual to that given in the Table.

Where three Bower Anchors are required, one them may be 15 per cent., and another 7½ per cent. lighter than the weight set forth above, provided the collective weight the three Anchors is equal to that given in the Table, but in no case may the best Bower Anchor be lighter than prescribed in Table, nor the third Bower be lighter than is allowed by this footnote.

All Anchor Stocks must be of acknowledged an proved description.

* The tests of Anchors in this Table are approx te tests; or as near the Statutory tests as can be expressed in Tons and aliquot parts of tons.

*(c)* All Anchors, including Stream and Kedge Anchors, exceeding 168lbs. in weight, ex. Stock, to be tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

*(c)* The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

*(d)* Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains, for the *tensile* strain, and 100 per cent. above the *tensile* strain for the *breaking* strain.

*(e)* When steel wire Towlines or Hawsers are adopted, see note *e* at side of Table.

Where a departure from the requirements of the Table for Hawsers and Warps is proposed, the same should be in all cases submitted in the first place for the approval of the Committee.

(*For Sailing Vessels see other side.*)

# CHAINS AND ANCHORS FOR *STEAM* VESSELS.

No. 22. Minimum Weights of Anchors, ex. Stock; Sizes and Lengths of Chains, and the proof strain to which they are to be tested per Chain Cables and Anchors Acts. Also sizes and lengths of Towlines, Hawsers and Warps. The Anchors, and the links of the Chains to be of unexceptionable form and proportions.

| Numbers for *IRON Vessels. See Foot Note (a)* | Ship's Tonnage. | Number. Bowers. | Number. Stream. | Number. Kedges. | Anchors. *(c)* Weight. Bowers *(b)* Ex. Stock. | Bowers *(b)* Test. * | Collective Weights. | Ex. Stock. Stream. | Ex. Stock. Test. * | Ex. Stock. Kedge | Ex. Stock. Test. * | Ex. Stock. 2nd Kdg | Ex. Stock. Test. * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tons. | | | | Cwts. | Tons. | Cwts. | Cwts. | Tons. | Cwts. | Tons. | Cwts. | Tons. |
| *a* 2750 | 75 | 2 | 1 | 1 | 3½ | 5 1⅛ | 7 | ¾ | — | ½ | — | — | — |
| *b* 3750 | 112 | 2 | 1 | 1 | 4¼ | 6 1⅝ | 8½ | 1¼ | — | ½ | — | — | — |
| *c* 4630 | 150 | 2 | 1 | 1 | 5 | 7 3⅞ | 10 | 1½ | 3 1⅛ | ¾ | — | — | — |
| *d* 5420 | 188 | 2 | 1 | 1 | 5¾ | 8 4⅛ | 11½ | 1½ | 3 1⅛ | ¾ | — | — | — |
| *e* 6150 | 225 | 2 | 1 | 1 | 6½ | 9 0⅝ | 13 | 2 | 4 1⅛ | 1 | — | — | — |
| *f* 6840 | 262 | 2 | 1 | 1 | 7¼ | 10 1⅛ | 14½ | 2¼ | 4 1⅛ | 1 | — | — | — |
| *g* 7490 | 300 | 3 | 1 | 1 | 8¼ | 12 | 23½ | 2½ | 5 | 1¼ | — | — | — |
| *h* 8670 | 375 | 3 | 1 | 2 | 10 | 13 1⅛ | 28½ | 3¾ | 6 3⅛ | 1¾ | 4 4⅛ | ¾ | — |
| *i* 9770 | 450 | 3 | 1 | 2 | 12 | 15 3⅛ | 34¼ | 4 | 6 3⅞ | 2 | 4 1⅛ | 1 | — |
| *j* 10790 | 525 | 3 | 1 | 2 | 13½ | 17 3⅛ | 38½ | 4¾ | 7 2⅛ | 2½ | 5 | 1¼ | 3 1⅛ |
| *k* 11740 | 600 | 3 | 1 | 2 | 15¼ | 18 | 43½ | 5¼ | 7 1⅛ | 2½ | 5 | 1½ | 3 1⅛ |
| *l* 12620 | 675 | 3 | 1 | 2 | 16¾ | 19 | 47¾ | 5½ | 7 1⅛ | 2¾ | 5 1⅛ | 1½ | 3 1⅛ |
| *m* 13450 | 750 | 3 | 1 | 2 | 18 | 21 1⅛ | 51¼ | 6½ | 8 1⅛ | 3¼ | 5 1⅛ | 1¾ | 4 1⅛ |
| *n* 15120 | 900 | 3 | 1 | 2 | 21 | 23 1⅛ | 60 | 7¼ | 9 3⅛ | 3½ | 5 1⅛ | 2 | 4½ |
| *o* 16720 | 1050 | 3 | 1 | 2 | 23½ | 25 3⅛ | 67 | 8 | 10 3⅛ | 4 | 6 3⅛ | 2¼ | 4½ |
| *p* 18260 | 1200 | 3 | 1 | 2 | 25½ | 25 3⅛ | 72¾ | 8½ | 10 1⅛ | 4¼ | 6 1⅛ | 2¼ | 4½ |
| *q* 19780 | 1350 | 3 | 1 | 2 | 27¾ | 26 1⅛ | 79 | 8¾ | 10 1⅞ | 4½ | 6 1⅞ | 2¼ | 4½ |
| *r* 21280 | 1500 | 3 | 1 | 2 | 30 | 28 1⅛ | 85½ | 9½ | 11 1⅛ | 4¾ | 7 3⅛ | 2½ | 5 |
| *s* 24220 | 1800 | 3 | 1 | 2 | 32 | 30 3⅛ | 91¼ | 10½ | 12 3⅛ | 5¼ | 7 1⅛ | 2½ | 5 |
| *t* 27140 | 2100 | 3 | 1 | 2 | 34 | 31 1⅛ | 97 | 10¾ | 12 1⅛ | 5½ | 7 1⅛ | 2½ | 5 |
| *u* 30020 | 2400 | 3 | 1 | 2 | 36½ | 33 3⅛ | 104 | 11¼ | 13 3⅛ | 5½ | 7 1⅛ | 2¾ | 5 3⅛ |
| *v* 32820 | 2700 | 3 | 1 | 2 | 38 | 34 1⅛ | 108¼ | 11½ | 13 3⅞ | 5¾ | 8 | 2¾ | 5 3⅛ |
| *w* 35450 | 3000 | 3 | 1 | 2 | 40 | 35 1⅛ | 114 | 12 | 13 1⅞ | 6 | 8 3⅛ | 3 | 5 1⅛ |
| *x* 39600 | 3500 | 4 | 1 | 2 | 41½ | 36 1⅛ | 159¾ | 12¾ | 14 1⅛ | 6½ | 8 1⅛ | 3¼ | 5 1⅛ |
| *y* 43600 | 4000 | 4 | 1 | 2 | 43 | 37 1⅞ | 165½ | 14 | 15 1⅛ | 7 | 9 3⅞ | 3½ | 5 1⅛ |
| *z* 47400 | 4500 | 4 | 1 | 2 | 45 | 39 3⅛ | 173¼ | 15¼ | 16 1⅛ | 7⅞ | 9 1⅛ | 3½ | 5 1⅛ |
| *a*† 51000 | 5000 | 4 | 1 | 2 | 46½ | 40 3⅛ | 179 | 16¾ | 18 | 8⅓ | 10 1⅛ | 4 | 6 3⅞ |
| *b*† 55000 | 5500 | 4 | 1 | 2 | 49 | 41 1⅛ | 188 | 19 | 19 1⅞ | 9½ | 11 1⅛ | 4½ | 6 1⅞ |
| *c*† 59000 | 6000 | 4 | 1 | 2 | 52 | 43 1⅛ | 198 | 22 | 22 3⅞ | 10½ | 12 3⅛ | 5¼ | 7 1⅛ |
| *d*† 63000 TO 70000 | 6500 TO 7000 | 4 | 1 | 2 | 55 | 45 3⅞ | 210 | 25 | 24 1⅛ | 12 | 13 1⅞ | 6 | 8 3⅛ |

| Stud-Chain Cables. *(c)* *(d)* Minimum Size. | Proved to Admiralty Test. | Breaking Test. | Length. |
|---|---|---|---|
| Inch. | Tons. | Tons. | Fathoms. |
| 1 1⅛ | 8 1⅛ | 12¾ | 120 |
| 1 2⅛ | 10 1⅛ | 15⅛ | 120 |
| 1 3⅛ | 11⅞ | 17 1⅛ | 135 |
| 1 4⅛ | 13¾ | 20⅝ | 165 |
| 1 5⅛ | 15 1⅛ | 23 1⅛ | 165 |
| 1 | 18 | 27 | 165 |
| 1 1⅛ | 20 1⅛ | 30 1⅛ | 165 |
| 1 2⅛ | 22¾ | 34⅛ | 195 |
| 1 3⅛ | 25⅞ | 38 | 195 |
| 1 4⅛ | 28⅛ | 42¼ | 210 |
| 1 5⅛ | 31 | 46½ | 210 |
| 1 6⅛ | 34 | 51 | 240 |
| 1 7⅛ | 37⅛ | 55⅝ | 240 |
| 1 8⅛ | 40 1⅛ | 58 7⅛ | 240 |
| 1 9⅛ | 43 1⅛ | 61 1⅛ | 270 |
| 1 10⅛ | 47 1⅛ | 66 1⅛ | 270 |
| 1 11⅛ | 51¼ | 71¾ | 270 |
| 1 12⅛ | 55¼ | 77¼ | 270 |
| 1 13⅛ | 59¼ | 82⅝ | 270 |
| 1 14⅛ | 63¼ | 88 1⅛ | 270 |
| 1 15⅛ | 67 1⅛ | 94 1⅛ | 300 |
| 2 | 72 | 100 1⅛ | 300 |
| 2 1⅛ | 76 1⅛ | 107 1⅛ | 300 |
| 2 2⅛ | 81¼ | 113¾ | 300 |
| 2 3⅛ | 86¼ | 120 1⅛ | 300 |
| 2 4⅛ | 91 | 127 1⅛ | 300 |
| 2 5⅛ | 96¼ | 134⅝ | 300 |
| 2 6⅛ | 101½ | 142 1⅛ | 330 |
| 2 7⅛ | 107 | 149 1⅛ | 330 |
| 2 8⅛ | 112½ | 157 1⅛ | 330 |

| Ship's Tonnage | Numbers for *IRON Vessels. See Foot Note (a)* | Stream, Chain or Steel Wire. Chain. *(c)* F'thms | Chain. *(c)* Inch. | Steel Wire. Size. Inch. | Steel Wire. Breaking Test. Tons. | Towline: Hemp or Steel Wire *(e)* Hemp. F'thms | Hemp. Inch. | Steel Wire. Size. Inch. | Steel Wire. Breaking Test. Tons. | Hawsers and Warps. 90 fathoms of each Inch. | Inch. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tons. | | F'thms | Inch. | Inch. | Tons. | F'thms | Inch. | Inch. | Tons. | Inch. | Inch. |
| 75 | *a* 2750 | 45 | 1⅛ | — | — | 75 | 5½ | | | 3 | — |
| 112 | *b* 3750 | 45 | 1⅜ | 2 | 7 | 75 | 6 | | | 4 | — |
| 150 | *c* 4630 | 45 | 1⅜ | 2 | 7 | 75 | 6 | | | 4 | — |
| 188 | *d* 5420 | 45 | 1⅜ | 2¼ | 9½ | 75 | 6½ | | | 4 | — |
| 225 | *e* 6150 | 45 | 1⅜ | 2¼ | 9½ | 75 | 7 | | | 5 | — |
| 262 | *f* 6840 | 45 | 1⅛ | 2¾ | 15½ | 75 | 7½ | | | 5½ | — |
| 300 | *g* 7490 | 60 | 1⅛ | 2¾ | 15½ | 75 | 7½ | | | 5½ | — |
| 375 | *h* 8670 | 60 | 1⅜ | 2¾ | 15½ | 75 | 8 | | | 6 | — |
| 450 | *i* 9770 | 60 | 1⅜ | 3 | 18 | 75 | 8½ | | | 6½ | — |
| 525 | *j* 10790 | 60 | 1⅜ | 3 | 18 | 75 | 8½ | | | 6½ | 4 |
| 600 | *k* 11740 | 60 | 1⅛ | 3½ | 22 | 90 | 9 | | | 7 | 5 |
| 675 | *l* 12620 | 60 | 1⅛ | 3½ | 22 | 90 | 9 | | | 7 | 5 |
| 750 | *m* 13450 | 60 | 1⅜ | 3½ | 26 | 90 | 9½ | | | 7½ | 5½ |
| 900 | *n* 15120 | 75 | 1⅜ | 3½ | 26 | 90 | 10 | 3¼ | 22 | 8 | 5½ |
| 1050 | *o* 16720 | 75 | 1 | 3¾ | 29 | 90 | 10 | 3¼ | 22 | 8 | 6 |
| 1200 | *p* 18260 | 75 | 1 | 3¾ | 29 | 90 | 10 | 3¼ | 22 | 8½ | 6 |
| 1350 | *q* 19780 | 75 | 1⅛ | 4 | 33 | 90 | 11 | 3½ | 26 | 9 | 7 |
| 1500 | *r* 21280 | 75 | 1⅛ | 4 | 33 | 90 | 11 | 3½ | 26 | 9 | 7½ |
| 1800 | *s* 24220 | 75 | 1⅛ | 4½ | 35 | 90 | 12 | 4 | 33 | 9½ | 7½ |
| 2100 | *t* 27140 | 75 | 1⅛ | 4½ | 35 | 100 | 12 | 4 | 33 | 9½ | 8 |
| 2400 | *u* 30020 | 90 | 1⅛ | 4½ | 35 | 100 | 12 | 4 | 33 | 10 | 8½ |
| 2700 | *v* 32820 | 90 | 1⅜ | 4½ | 39 | 120 | 12 | 4 | 33 | 10 | 8½ |
| 3000 | *w* 35450 | 90 | 1⅜ | 4½ | 39 | 120 | 13 | 4½ | 39 | 10 | 9 |
| 3500 | *x* 39600 | 90 | 1⅜ | 4½ | 39 | 120 | 13 | 4½ | 39 | 11 | 9 |
| 4000 | *y* 43600 | 90 | 1⅝ | 4¾ | 47 | 120 | 14 | 4¾ | 47 | 12 | 10 |
| 4500 | *z* 47400 | 90 | 1⅝ | 4¾ | 47 | 120 | 14 | 4¾ | 47 | 12 | 10 |
| 5000 | *a**51000 | 90 | 1⅝ | 5 | 59 | 120 | 15 | 5 | 59 | 12 | 10 |
| 5500 | *b**55000 | 120 | 1⅝ | 5 | 59 | 130 | 15 | 5 | 59 | 12 | 10 |
| 6000 | *c**59000 | 120 | 1⅝ | 5 | 59 | 130 | 15 | 5 | 59 | 13 | 11 |
| 6500 TO 7000 | *d**63000 TO 70000 | 120 | 1⅝ | 5¼ | 71 | 130 | 16 | 5¼ | 71 | 13 | 11 |

N.B.—The Italic letters preceding the Equipment numbers correspond with letters printed in the thirteenth column of the page of the Register Book to indicate the Equipment numbers of vessels per this Table.

*(a)* By Section 39 of the Rules for the building and classification of Iron and Steel Ships, it is provided that the equipment is to be regulated by the number produced by the sum of the measurements of the half moulded breadth of the vessel amidships, the depth from the upper part of keel to the top of the upper deck beams, and the girth of the half midship section to the same height, multiplied by the length, for a one, two, and three-decked vessel, and for a spar-decked vessel.

For a vessel having a complete awning-deck or a continuous shade deck, the equipment number is to be increased one-eighth beyond what it would be if the vessel were flush-decked.

For a vessel with a partial awning-deck, poop, topgallant forecastle, bridge-house, or a raised quarter-deck, the equipment number is to be increased beyond that for a flush or spar-deck vessel by that proportion of the addition made for a complete awning deck which the combined length of the erections bears to the length of the vessel.

*Lloyd's Register of Shipping, 2, White Lion Court, Cornhill, 10th December, 1885.*

*(b)* In order to meet the requirements of different trades, the weights of Anchors as given in the above Table may be modified as under:—

Where two Bower Anchors only are required, one of them may be 7½ per cent. lighter than the weight set forth above, provided the collective weight of the two Anchors is equal to that given in the Table.

Where three Bower Anchors are required, one of them may be 15 per cent., and another 7½ per cent. lighter than the weight set forth above, provided the collective weight of the three Anchors is equal to that given in Table, but in no case may the best Bower be lighter than prescribed in Table, nor the third Bower be lighter than is allowed by this footnote.

Where four Bower Anchors are required, one may be 15 per cent., and another 7½ per cent. lighter than the weight set forth above, provided the collective weight of the four Anchors is equal to that given in the Table, but two at least of the Bower Anchors must not be lighter than required by the Table. All Anchor Stocks must be of acknowledged and approved description.

* The tests of Anchors in this Table are approximate tests; or as near the Statutory tests as can be expressed in tons and aliquot parts of tons.

*(c)* All Anchors, including Stream and Kedge Anchors, exceeding 168lbs. in weight, ex. Stock, to be Tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

*(c)* The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

*(d)* Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains, for the *tensile* strain, and 100 per cent. above the *tensile* strain for the breaking strain.

*(e)* When steel wire Towlines or Hawsers are adopted, see note *e* on the other side of this Table.

Where a departure from the requirements of the Table for Hawsers and Warps is proposed the same should be in all cases submitted in the first place for the approval of the Committee.

## EQUIPMENT FOR TRAWLERS.

| Registered Tonnage. | Anchors. No. | Anchors. Weight ex. Stock. 1st. | 2nd. | 3rd. | Chains. Diam. | Chains. Length. | Tests. |
|---|---|---|---|---|---|---|---|
| 50 | 3 | 3 cwt. | 3 cwt. | 1¾ cwt. | 1 2/16″ | 60 fms. | The Anchors and Chains to be tested at a Public Testing Machine. |
| 65 | 3 | 3½ cwt. | 3½ cwt. | 2 cwt. | 1 3/16″ | 60 fms. | |
| 80 | 3 | 4 cwt. | 4 cwt. | 2½ cwt. | 1 4/16″ | 60 fms. | |

*The following Machines are recognised by the Committee of Lloyd's Register for the purpose of testing Anchors and Chains while licensed by the Board of Trade for that purpose:—*

| | | |
|---|---|---|
| London—Trinity Proving House ..... | Superintendent, (*Closed May, 1875*). | Mr. L. R. Isitt. |
| Tipton—Lloyd's Proving House..... | ditto | Mr. E. R. Isitt. |
| Assistant | ditto | Mr. H. Green. |
| Netherton—Lloyd's Proving House..... | ditto | Mr. D. G. Lewis. |
| Assistant | ditto | Mr. W. Turton. |
| Low Walker—Lloyd's Proving House .... | ditto | Mr. R. Burrell. |
| Assistant | ditto | Mr. J. Tron. |
| Chester (Saltney)—Lloyd's Proving House. | ditto | Mr. A. S. Jack. |
| Assistant | ditto | Mr. J. Littler. |
| Glasgow—Lloyd's Proving House ..... | ditto | Mr. E. Seedhouse. |
| Cardiff—Lloyd's Proving House ..... | ditto | Mr. G. W. Penr. |
| Sunderland—River Wear Commission, Public Test | ditto | Mr. J. Hartness. |

*And any other Machine will be recognised by the Committee which is or may be hereafter duly licensed by the Board of Trade for the purpose of testing Anchors and Chains.*

## SHIPS CLASSED E.

**Section 64.** Will comprise all ships which shall be found on Survey fit for the conveyance of cargoes not in their nature subject to sea-damage *on any voyage.*

**Section 65.** 1. To entitle vessels to this Character they must be subjected to the following Survey.

2. To be placed on blocks so that the keel and bottom may be examined, and the caulking tested. Treenails, not less than twelve on each side, to be driven out at various parts of the ship, for the purpose of ascertaining their condition and that of the timbers and planking through which they pass.

3. The windlass to be examined, and the chain cables to be ranged, and the equipment generally examined and reported upon.

4. If the E Character be then assigned, it shall be Continued, subject to an annual survey, for a period not exceeding three years, at the expiration of which time the Character will be discontinued unless the vessel be again submitted to a similar Special Survey.*

**Section 66.** The Classification of Ships with the Character I discontinued.

## CAULKING.

**Section 67.** 1. The Bottom of every ship is to be CAULKED† once in every five years, unless wood-sheathed and felted, and then once in every seven years, except in the case of *Teak-built ships*, upon which a Special Survey may have been requested, and the Surveyors having ascertained, by the removal of a strake of sheathing fore and aft under the wales, and a strake at the first futtock-heads, and by causing listings to be cut out at the hood ends, that such caulking is not required, the same may then be dispensed with.

2. If any ship shall be stripped within the periods above mentioned, her bottom is to be caulked, *if necessary.* (*See* Section 70.)

## DOUBLING.

**Section 68.** 1. In all cases in which ships may be doubled, doubling of not less than the thickness hereinafter mentioned will be required, the same to be properly wrought and fastened as follows: in every instance the doubling is to be at least single fastened either with treenails or with bolts,‡ and a through-bolt in every butt. If treenails be used, every treenail must, if practicable, be a through fastening; and, if bolts be used, then one-sixth of them from the lower part of the bilge upwards must be through and clenched on the ceiling in addition to the butt bolts. In all cases of doubling, the rudder braces are to be removed.

* For doubling of Ships of the above Class, *see* Section 68.

† In cases where ships have been doubled with doubling of less thickness than is required by, or not fastened in accordance with, the Rules, it will not be imperative that such doubling be stripped at the expiration of seven years, as required for ordinary sheathing; but if, upon Survey, the doubling be found in good condition, the period for its remaining on may be extended, with the sanction of the Committee, to a term not exceeding ten years, provided the doubling below the wales be copper or yellow metal fastened or treenailed.

‡ In ships hereafter doubled and sheathed with copper or yellow metal, if the doubling be fastened exclusively with bolts, the same must be of copper or yellow metal.

If the doubling be fastened with treenails and bolts, as described in the above section, and the bolts be of iron, the vessel must be subjected to a Special Survey, and bolts at the discretion of the Surveyor be driven out to ascertain their condition; such surveys to be held within periods not exceeding three years, and whenever the copper or yellow metal sheathing is stripped.—*6th July*, 1876.

2. The throat bolts of iron knees, and the bolts of iron hooks, crutches, and pointers, must be renewed through the doubling.

3. The thickness of the doubling for the wales and bottom, on ships

| | |
|---|---|
| Under 400 tons to be not less than ... ... ... | 2 inches |
| of 400 „ and under 600 tons ... ... ... | $2\frac{1}{2}$ „ |
| of 600 „ and above ... ... ... ... | 3 „ |

4. On the topsides of ships not exceeding 300 tons, the thickness may be $1\frac{1}{2}$ inches.

5. No ship hereafter doubled shall be entitled to the Character A, or A in Red, unless at the time of doubling it be ascertained, in either case, that the frame is capable of securely retaining the fastenings, *by one treenail being driven out in every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of treenails and timbers, and of the planking in the treenail holes*, or should the state of the treenails indicate defective timbers, or should the outside planking be bolt-fastened, then, by cutting out listings or plank at the discretion of the Surveyor.

6. Before doubling, the original fastenings in the outside planking and the rider bolts should be ascertained to be in efficient condition, or be made good, but all treenails, from *the upper part of chocks at second futtock-heads to the lower part of chocks at floor-heads to be renewed with through treenails of hard wood for at least half the length of the ship amidships*, unless the Surveyors, by having a sufficient number driven out, fully satisfy themselves that they are well made, tightly driven, and in good condition.

## DIAGONAL DOUBLING.

7. If the doubling be applied diagonally, on the wales and bottom, it will be allowed to be of the following thicknesses, viz. :—

| | |
|---|---|
| In ships under 500 tons ... ... ... ... | $1\frac{1}{2}$ inches |
| „ of 500 tons and under 1,000 tons ... | 2 „ |
| „ 1,000 tons and upwards ... ... | $2\frac{1}{2}$ „ |

8. *Diagonal* doubling on ships is to be fastened as under, viz. :—

9. If worked not above 11 inches broad, it may be single fastened with a through bolt at every butt, every *fifth* fastening to be a through bolt or a through treenail of hard wood; the distance between these through fastenings not to exceed 4 ft. 6 in. The remaining fastenings to consist of through treenails or two long and two short dump bolts; the length of the short dumps may be half an inch less than the combined thickness of the doubling and the original outside plank, and that of the long dumps to be not less than the thickness of the doubling added to twice the thickness of the original outside plank.

10. At the upper edge of the doubling, which is to be sufficiently high to enable the butt bolts of the diagonal planks to pass through the lower deck spirketting, a strake of planking is to be taken out fore and aft, and a strake is to be worked in its place, on the timbers, sufficiently thick to project to the outside of the doubling. The butts of the diagonal doubling are then to be rabbeted into this thick strake; or a fore and aft strake of doubling may be worked below the thick strake, and be rabbeted into it, and the butts of the diagonal doubling may be butted against this fore and aft strake. Or, if the strake of planking is not removed and the thick strake is not worked, there must be at the upper ends of the diagonal doubling a fore and aft strake, having its upper edge let into the original plank sufficient to form a caulking seam, say

not less than 1½ inches. The lower ends of the diagonal doubling to be worked against two strakes of fore and aft doubling, the lower edge of the lower strake being rabbeted into the keel, and to be not less in thickness than one and a half times the thickness of the doubling. All diagonal doubling to be of rock elm or of equally suitable material, and be wrought on hair felt.

## EXTENSION OF CLASS FOR DIAGONAL DOUBLING.

11. Ships diagonally doubled in conformity with the Rules, after the expiration of twelve months from the date of launching, shall be allowed an extended period of classification to the extent described hereafter.

12. Also ships surveyed for Continuation, Restoration, and the Character A 1 in Red, which shall be diagonally doubled in conformity with the Rules, shall, on account of such doubling, be allowed an extension of the term otherwise assigned to them as under, viz. :—

13. Ships built of wood materials of the 5 years' grade and under, shall be allowed 2 years additional on account of being doubled diagonally ; those built of materials exceeding the 5 and under the 12 years' grade, shall be allowed 3 years additional ; and those built of 12 years' materials, 4 years additional.

14. To entitle ships to the advantages of this Rule when surveyed for Continuation, under Survey No. 2, Section 54, or for A in Red under Second Survey, Section 60, it will be necessary, in addition to the other requirements of the Rules, that in *flush-decked Vessels* the planksheer be removed on each side all fore and aft, so as to expose the heads of the timbers and the back of waterways to view ; also that a strake of upper deck next the waterway be taken out all fore and aft, and the beams of the decks below be tested by boring and sounding. But in ships having a poop and forecastle it will be necessary to remove the planksheer on both sides from the poop to the forecastle, and the mouldings in continuation of the planksheer forward and aft ; or a portion of a strake of topside planking from the fore part of the poop aft, and from the after part of the forecastle forward ; but it will not be necessary to remove planking of topsides from poop to forecastle where the planksheer has been removed, if the timbers thus exposed are in good condition ; nor the strake of deck abaft the first beam within the poop and before the first beam within the forecastle, provided the beams are tested by boring and sounding and be found good.

15. If a ship be doubled at the time she undergoes the Continuation Rule, 1st Survey, or the 1st Rule for A in Red, the removal of a strake all fore and aft at the upper edge of the doubling may be substituted for the removal of the planksheer.

16. A similar relaxation of the Rule will, upon special application to the Committee, be allowed in the case of spar-decked ships.

## FURTHER EXTENSION OF CLASS FOR DIAGONAL DOUBLING.

17. Ships which have been diagonally doubled in conformity with the Rules, Section 68, and have received an extension of class for the same, may, at a subsequent period, either on the expiration of the period of continuation under the second rule, or of Restoration, or of second continuation upon Restoration, or second Survey for A 1 in red, receive a *further extension* of class for diagonal doubling, provided the following Survey be complied with, and the vessel be found or placed in good and efficient condition.

18. The period of this *further extension* to be 3 years in the case of vessels built of materials of the 12 years' grade and above, and 2 years in the case of vessels where the timber materials are below the 12 years' grade.

## SURVEY.

19. The ship to be placed on blocks in dry dock, or on ways, so that the keel and bottom may be seen and properly examined (unless she has been thus surveyed by the Society's officers within the previous twelve months); the hold to be cleared, and proper stages made both inside and outside; the limbers, and all air-courses to be cleared; and, if the ship has not already got the air-courses described in Section 37, they are now to be made; the outside planking to be scraped bright where the Surveyors may consider it to be necessary from any apparent defects; bolts of lower deck (if through of iron) in number not less than three on each side, and treenails in number not less than twelve on each side, to be driven out at various parts of the ship, and all parts of the ship, and the equipment to be thoroughly examined, in order to ensure the vessel being in good and efficient condition, and worthy of the extension of class herein contemplated.

20. Such Ships to be marked in the Register Book thus :—dia. d. 3 yrs. or 2 yrs., as the case may be.

## DOUBLING OF VESSELS CLASSED Æ and E.

21. All vessels of the Æ or E class, or vessels unclassed, which may be found on Survey to be, from *local* defects, in a condition requiring considerable opening out and consequent repairs, to entitle them to a class in the Register Book, or to continue on their class, may be rendered eligible for classification, or for the Æ character, provided they be diagonally doubled, the thickness of the same being from one inch in thickness and upwards, according to the size of the vessel.

22. In all such cases, however, the Local Surveyor should forward a report, setting forth the condition of all parts of the vessel, and the mode of doubling proposed to be adopted, for the sanction of the Committee.

23. A careful examination is to be made of the condition of the original fastenings, and the planking of the bottom, &c., before the doubling is fitted, and the Surveyors are to satisfy themselves that the timbers of the frame and planking are sufficiently sound to receive the fastenings.

24. When the doubling is under two inches in thickness it may be fastened with short bolts, spikes or nails, galvanized, on the alternate edges not exceeding twelve inches apart; the length of the bolts, spikes or nails, may be one inch less than the combined thickness of the doubling and outside planking with longer intermediate bolts in the butts and about five feet apart, driven into the timbers of the frame.

25. When the doubling is two inches in thickness or above, in addition to the above fastenings, the butt bolts must be through and clenched.

26. The doubling in all cases is to be rabbeted into the stem, sternpost, and keel, and a strake of longitudinal doubling is to be fitted adjoining the keel, and to be one-half an inch thicker than the diagonal doubling, if the latter be two inches or less in thickness.

27. Should the Æ character be then assigned, the same will be continued, subject to annual Survey, provided once in every four years the keel and bottom be surveyed, and the caulking tested, and the hold cleared; the windlass unhung and chain cables ranged, and the equipments and general condition of the vessel be found satisfactory. (For periodical Surveys of ships classed E, *see* Section 65.)

28. Where modifications are desired, Shipowners may submit their proposals for the approval of the Committee through the resident Surveyor.

## IRON-FASTENED SHIPS.

**Section 69.** All ships, although iron-fastened (except as hereinafter mentioned), shall be classed in the same manner as copper-fastened ships, so long as they remain unsheathed with copper, provided they are, in all other respects, constructed in accordance with the Rules; but, when sheathed with copper over the iron fastenings, the words "Coppered over Iron Bolts" shall be added to the Character in the Register Book, and continued until the ship be thoroughly copper-fastened.

## SHIPS BUILT IN INDIA.

**Section 70.** Ships built in India, although fastened with iron, shall be permitted to be copper-sheathed without any mark being placed in the book, provided the bottom be felted or chunamed and wood-sheathed, and subjected to a careful examination of the iron fastenings on every occasion on which the sheathing is stripped off, for which purpose some of the bolts and nails are to be taken out of the lower part of the bottom, and to be seen by the Surveyor; but no such ship shall be permitted to continue either on the A or on the A in Red class for a longer period than one-half the number of years beyond the term originally assigned for her remaining on the A Character, unless the bottom shall have been doubled, or the whole of the iron fastenings taken out or properly secured, and the bottom refastened with bolts, or treenails, or both, including the middle line, breast-hook, and crutch bolts. (*See* Section 67.)

## RUDDER, PUMPS, WINDLASS, HAWSE-PIPE, &c.

**Section 71.** 1. The rudder, pumps, windlass, or capstan, scuppers, hawse-pipes, chain-plates, and side-lights to be good and efficient; and the windlass, if of wood, is in all cases to have a through square iron spindle, ranging from $2\frac{1}{2}$ to 5 inches square, according to tonnage.

2. The hawse-pipes must be of sufficient size and thickness, and the outside flange of proper form to admit of an easy lead for the cable to the windlass, or capstan.

## EQUIPMENT.

**Section 72.** 1. All vessels are required to have their masts, spars, and rigging in good order, and sails in sufficient number and in good condition.

2. Every ship is to be provided with anchors, cables, &c., of approved quality, properly tested at a *public machine*, in number and length, as set forth in the Table, No. 22, annexed. (*See also* Section 32.)

3. In cases, however, where anchors and chain cables are manufactured abroad and supplied to *foreign owned vessels*, and testing certificates are furnished setting forth that the anchors and chain cables have been tested at a Government machine, or a machine under the control of a municipal body, or a similar responsible body, such certificates will be accepted as complying with the requirements of the Rules, for obtaining the figure 1, provided the remaining requirements of Table 22 be complied with, but in these cases the record of A.&C.P. will not be made in the Register Book.

4. A Certificate of all Chains and Anchors having been tested, and of the strain applied to them, must be produced before the ship is classed with the Figure 1.

**Section 73.** The length and condition of the Chain Cables are to be ascertained by removal from the lockers on every Special Survey for Classification.

**Section 74.** In all cases where hempen cables are used, one-sixth more in length will be required.

**Section 75.** **BOATS**:—All vessels under 150 tons to be provided with one good Boat; and every vessel of 150 tons and above to have a suitable number. The Surveyors are to be particular in examining and reporting the condition of the boats of *all* vessels.

**Section 76.** 1. The efficient state and condition of the whole of the ship's equipment will be designated by the Figure 1; and where the same is found insufficient in quantity, or defective in quality, by a dash thus — following the character assigned to the ship.

## DEFECTIVE EQUIPMENT.

2. In the case of a steam-vessel already classed, of which the engines or boilers are reported to be so far inefficient or defective as to imperil the vessel's safety, an indication to that effect will be made in the Register Book by a red ring being stamped or posted over the figure 1 for equipment, and in the case of vessels about to be built, for which drawings are submitted for the approval of the Committee, and where the engines or boilers are of novel description, or where experience has not sufficiently shown the safety of the principle or mode of application involved, the figure 1 will not be assigned, and the words—"Boiler Experimental," or "Machinery Experimental," will be placed against the class of the vessel, in the Register Book; but, where in the opinion of the Committee the Machinery or Boilers are deemed so far inefficient and defective as to imperil the vessel's safety, the figure 1 will be withheld, and a red ring inserted in place thereof; and, in the case of masts or rigging of a ship which are reported to be so far defective as to imperil the vessel's safety, the indication in the Register Book will be made by a black ring, stamped or posted over the figure 1 for equipment; as described in the foot-note on the page of the Register Book and in the Key thereto; and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules. (*See also* Section 78 and 81 for Steam Ships.)

## SHIPS NAVIGATED BY STEAM.

**Section 77.** Steam ships are to be subject to the same periodical surveys as sailing vessels, and whenever the boilers are taken out the vessel is to be submitted to a particular and special Survey, in order to ascertain her general condition. (*See also* Sections 78 and 81.)

## MACHINERY AND BOILERS OF STEAM SHIPS.

**Section 78.** 1. In new vessels propelled by steam, and in vessels fitted with new engines or boilers, the machinery is to be submitted to the inspection of the Society's Engineer-Surveyors, who will furnish a report to the Committee describing them, in the manner and form, No. 8 annexed. The Committee will thereupon, if found satisfactory, grant a certificate, and insert in the Register Book the notification "LMC." *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE) indicating that the machinery and boilers are certified to be in good order and safe working condition. (*See* Sections 76 and 81.)

2. If the machinery or boilers are specially surveyed during their construction, a distinguishing mark ✠ in red is added, thus: "✠ LMC." or "✠ NE&B85," or "✠ NB85."

3. In order to facilitate this inspection, the plans of the machinery and boilers should be examined, and from them the working pressure fixed.

4. In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions (*See* Circular No. 438*, page 79):—

1. The material of stays and of plates not exceeding 1 inch in thickness is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section.

   In plates above 1 inch and not more than 1⅛ inch in thickness the ultimate strength must not be less than 26 and not more than 29 tons per square inch, and in plates above 1⅛ inch in thickness the ultimate strength must not be less than 26 tons and not more than 28 tons per square inch.

   In all cases the ultimate elongation must not be less than 20 per cent. in a length of 8 inches.*

   It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82 degrees Fahrenheit.

2. Steel rivets are to be considered as part of the material, and, in addition to being subjected to a shearing test, they must be capable of withstanding the same tests as the plates are required to undergo.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the construction of boilers.

4. All the holes in steel boilers should be drilled; but, if they be punched, the plates are to be afterwards annealed.

5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.

6. No steel stays are to be welded.

7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

5. The Surveyors will be guided in fixing the working pressure by the tables and formulæ annexed.

6. Any novelty in the construction of the machinery or boilers to be reported to the Committee.

7. The boilers, together with the machinery, to be inspected at different stages of construction.

8. The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice the working pressure, and carefully gauged while under test.

9. Two safety valves to be fitted to each boiler and loaded to the working pressure in the presence of the Surveyor. If common valves are used, their combined areas to be at least half a square inch to each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor; the accumulation in no case is to exceed 10 per cent. of the working pressure.

10. An improved safety valve is also to be fitted to the superheater.

11. In winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for Iron Boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

12. Each valve is to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety-valve spindles are to extend through the covers and to be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

13. Stop valves are to be fitted so that each boiler can be worked separately.

14. Each boiler is to be fitted with a separate steam-gauge, to accurately indicate the pressure.

15. Each boiler is to be fitted with a blow-off cock independent of that communicating with the sea.

16. The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyors.

17. Gauges of an approved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

18. The engines are to be fitted with two feed pumps each capable of supplying the boilers; the pumps, &c., are to be so arranged that either can be overhauled whilst the other is at work.

19. The engines are to be fitted with two bilge pumps, which are to be so arranged that either can be overhauled whilst the other is at work.

20. In engines of 70 H.P. and under, one feed pump and one bilge pump will be deemed sufficient provided they are of adequate capacity.

21. A bilge injection or a bilge suction to the circulating pump is to be fitted.

22. Engine bilge pumps are to be so fitted as to pump from each compartment of the vessel. The roses in engine-room and mud boxes are to be placed in positions where they are easily accessible, and to be to the satisfaction of the Surveyors.

23. A donkey pump is to be provided capable of supplying the boilers with water. A donkey is to be so fitted as to pump from each compartment, to deliver water on deck, and, if no hand pump is fitted in engine-room, it must be fitted to be worked by hand.

24. All steam and feed pipes are to be of copper, of a thickness to the satisfaction of the Surveyors.

25. All discharge pipes are to be, if possible, carried above the deep-load line, and to have discharge-valves fitted *in an accessible position.*

26. No pipes are to be carried through the bunkers without being properly protected.

27. Bilge suction pipes are to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

## COCKS, PIPES, AND SEA CONNECTIONS.

28. With a view to ensuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows in all new vessels and in vessels having new engines or boilers

29. All sea-cocks are to be attached to Kingston valves of a height sufficient to lift them up to the level of platforms.

30. Cocks and valves connecting all suction pipes are to be fixed above the stoke-hold and engine-room platforms.

31. The arrangement of pumps, bilge injections, suction and delivery pipes, is to be such as will not

permit of water being run from the sea into the vessel by an act of carelessness or neglect. Any defective arrangement is to be reported to the Committee.

## SPARE GEAR.

32. The articles of spare gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz. :—

2 connecting rod top-end bolts and nuts
2 connecting rod bottom-end bolts and nuts
2 main-bearing bolts
1 set of coupling bolts
1 set of feed and bilge pump valves
1 set of piston springs (where common springs are used)
A quantity of assorted bolts and nuts
Iron of various sizes.

33. In addition to the foregoing, the following articles are recommended to be carried with a view to expedite repairs and lessen delay in distant ports, viz. :—

Crank shaft
Propeller shaft
Propeller, or a full set of blades
Stern bush, or lignum-vitæ lining for bush
Air pump rod
Circulating pump rod
H.P. valve spindle
L.P. valve spindle
1 set of check valves
1 pair of connecting rod brasses
1 pair of cross-head brasses
1 set of link brasses
1 cylinder escape valve and spring
1 eccentric strip complete
6 junk ring bolts
6 cylinder cover bolts
4 valve chest cover bolts
2 dozen boiler tubes
3 dozen condenser tubes
1 set of safety valve springs.

## PERIODICAL SURVEYS OF MACHINERY, ENGINES AND BOILERS. (*See* N.B. at foot.)

34. The machinery and boilers of all steam ships are to be surveyed annually, if practicable, and in addition are to be submitted to a Special Survey every four years upon the occasion of the vessels undergoing the Special periodical Surveys, Nos. 1, 2, and 3, prescribed in the Rules.

35. At these Special Surveys the propeller, stern-bush, and fastenings of the sea connections are to be examined while the vessel is in dry dock, and, if deemed necessary by the Surveyors, the stern shaft is to be drawn and examined, at least once in four years, and more frequently if deemed necessary by the Surveyors.

36. The cylinders, pistons, slide valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

37. The sea connections and arrangements of cocks, pipes, bilge suctions, roses, &c., are to be examined.

38. The boilers and superheaters are to be examined internally and externally, and if deemed

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when Repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure; the safe working pressure is to be determined by their actual condition.

39. The safety valves are to be examined and set to the safe working pressure.

40. If satisfactory, these surveys will be recorded in the Register Book thus: "L.MC. 5,85" *in red*; or "B.&M.S. 5,85" *in red.*

41. "L.MC." (LLOYD'S MACHINERY CERTIFICATE) with a date, denotes that the machinery and boilers are fitted in accordance with the Rules, and were found upon examination at that time to be in good condition.

42. "B.&MS." (BOILERS AND MACHINERY SURVEYED) with a date, denotes that the boilers and machinery, though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

43. In the event of either the machinery or boilers appearing to be impaired to such an extent as renders it desirable that either or both be specially surveyed within the periods prescribed above, a Certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

BOILERS.

44. The boilers of all steam ships are to be specially surveyed when six years old, and subsequently they are to be specially surveyed annually.

45. At these surveys the boilers and superheaters are to be examined internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure; the safe working pressure is to be determined by their actual condition.

46. The safety valves are to be examined and set to the safe working pressure.

47. If satisfactory, these surveys will be recorded in the Register Book thus: "B.S.5,85" *in red.*

48. "B.S." (BOILERS SURVEYED) with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

49. In the event of the boilers appearing to be impaired to such an extent as renders it desirable that they be specially surveyed within the periods prescribed above, a Certificate for a limited period will be granted according to the nature of the case.

**Section 79.** **HULL**:—The Surveyors are directed to examine and report the scantling of timbers, plank, and fastenings, and to state where built, and by whom, in the same manner as directed for sailing vessels.

**Section 80.** The Surveyors are required to report the number, size, length, fastenings, and mode of arrangement of the engine and boiler *sleepers*, and the description of timber of which they are composed, and whether diagonally trussed with wood or iron, and to what extent; the length, size, and fastenings of shelf-pieces and paddle-beams; and whether the vessel is constructed with sponsons and how they are formed; and to give the length and shifting of the plank outside and inside

**EQUIPMENT.**

**Section 81.** 1. The Surveyors are to examine and report the number and description of the masts, spars, sails, anchors, cables, hawsers, warps, and boats, as directed to be done for sailing vessels. For weight of anchors, size and length of chains, *see* Table No. 22 and Section 32, *also* Sections 72 to 76.

2. The boilers and machinery are to be considered as part of the equipment, and, unless the Surveyors are satisfied of their efficiency, the figure 1 will be withheld, and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules. (*See also* Sections 76 to 78.)

**Section 82. BOATS**:—The Surveyors are to be particular in examining and reporting the condition of the boats of all vessels. (*See* Section 75.)

## FOREIGN BUILT SHIPS CLASSED WITH THE CHARACTER F.

**Section 83.** 1. Foreign built Ships *which have not been constructed in accordance with the Rules*, and have not been surveyed by the Surveyors to this Society during construction, and for which the Owners have heretofore desired the character **F**, have been surveyed as follows :—

### SURVEY No. 1.

2. In the case of a ship classed **F** of less than four years old, she was on such survey either placed in dry dock or laid upon blocks upon ways, so that the keel and bottom were seen and properly examined.

3. The hold was cleared, and proper stages were made both inside and outside.

4. All air-courses and the limbers were cleared.

5. Bolts and treenails were driven out at different parts of the ship, and in sufficient numbers to enable the Surveyors to ascertain their condition; the condition of the plank and timbers in the treenail holes was also ascertained.

6. A listing of not less than four inches wide, and equal to one-fifth of the length of the ship on each side was cut out below each set of clamps or shelves in such parts as the Surveyors may have required, sufficient to enable them to ascertain the size and condition of the frame.

7. The condition of the oakum and caulking was ascertained.

8. The windlass was unhung, and its wood lining sufficiently stripped for examination.

9. The cables and general equipment were attended to as prescribed in Sections 72 to 76, and in Table 22.

10. The Surveyors then examined and reported upon the ship, as to the state of the timbers of the frame (where examined), planking inside and outside, decks, waterways, beams, knees, keel, keelsons,

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* Mem. 1st July, 1876 :—*The Character* **F** *will not in future be assigned in the first Classification of Ships.*

*Those Ships, however, which have already been assigned this character will be allowed to retain the same upon Periodical Survey in accordance with the requirements of Section* 83 *of the Rules. Owners of Ships so classed are, at the same time, invited to submit their Vessels for Classification with some other Character provided for in the Rules.*

stem, apron, hawse-timbers, knight-heads, breast-hooks, transoms, rudder, and windlass, the sheer and general form of the ship, particulars of materials and scantlings, so far as they were ascertained, and spacing of timbers and beams, thickness and shifting of plank, mode of fastening, and the sizes and condition of the bolts and treenails.

**SURVEY No. 2.**

11. In the case of a ship classed **F** of four or more years old when surveyed, in addition to the foregoing Survey, she was scraped bright from the light water-mark upwards, including the plank sheers and waterways; the beam-ends were examined by boring and sounding, and a listing of not less than four inches wide was cut fore and aft below each set of clamps or shelves, and the bilges at the discretion of the Surveyor, and a short listing outside at each buttock.

12. This Survey applicable to all ships of four or more years old when surveyed, whether they have had the short listings previously cut or not.

13. If after such examination all repairs have been done to the satisfactfon of the Surveyors, so as to enable them to make a favourable report, a class of efficiency has been granted by the Committee, and entered in the Register Book, which class will be retained for a period not exceeding four years, subject to annual surveys,—unless it shall be made to appear by the Owner that the ship has not been during that period in any port where the Society has a Surveyor.

14. These Surveys are noted in the Register Book, thus (S.S.No.1-85-4yrs.), S.S.No.2-85-4yrs.), indicating the special survey and date thereof

15. There are two designations of condition or Character, distinguished thus:—

**1 F.**
**2 F.**

16. **1 F** denotes ships which have been found on survey to be of a superior description, fit for the conveyance of dry and perishable goods to and from all parts of the world.

17. **2 F** denotes ships which, although not equal to the foregoing, have nevertheless been found on survey to be in a good and efficient condition, and fit for the conveyance of dry and perishable goods, on shorter voyages.

18. It is to be distinctly understood that the foregoing regulations are confined in their application to *Foreign Built Ships*.

19. These classes can, in the case of vessels already classed **F**, be repeatedly continued for a period of four years, by the ship being subjected to the requirements of Survey No. 2, and the Annual Surveys.

20. Owners of Ships so classed are, at the same time, invited to submit their Vessels for Classification with some other Character, provided for in the Rules.

21. To entitle the ships to Fig. 1, they must be supplied with stores in accordance with Table 22, attached to the Rules, and the general equipment attended to as prescribed in Sections 72 to 76.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,
*London*, 1*st July*, 1885

# TABLE A.

EXHIBITING THE NUMBER OF YEARS TO BE ASSIGNED TO THE DIFFERENT DESCRIPTIONS OF TIMBER USED IN SHIPS, THE SAME TO BE OF GOOD QUALITY, PROPERLY SEASONED, AND FREE FROM DEFECTS.

| | | TIMBERING. | | | | | | | | OUTSIDE PLANK, &c. | | | | INSIDE PLANK, &c. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Floors. | First Foothooks. | Second Foothooks. | Third Foothooks and Top Timbers. | Main and Rider Keelsons. | Transoms, Knightheads, Hawse-Timbers, Apron, and Deadw'd *(a)* Stem and Stern Post. | Beams and Hooks. | Knees. | Pall Bitt, Windlass, and Main Piece of Rudder. | From top of Keel to two-fifths the depth of Hold. | From two-fifths the depth of Hold to Wales. | Wales, Black-Strakes, Topsides, and Sheer-Strakes. | Upper deck Waterway, Spirk'ting, and Planksh'rs. | Shelves, Clamps, Limber and Bilge Strakes, Ceiling in Hold and betwixt Decks, also Spirketting and Waterway below the Upper Deck. | | |
| 1 | East-India Teak | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | East-India Teak | 1 |
| 2 | English, African, & Live Oak, Adriatic, Italian, Spanish, Portuguese, and French Oak; Morung Saul, Greenheart, Morra, Iron Bark, and White Iron Bark | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | English, African, & Live Oak, Adriatic, Italian, Spanish, Portuguese, and French Oak; Morung Saul, Greenheart, Morra, Iron Bark, and White Iron Bark | 2 |
| 3 | Cuba Sabicu, Pencil Cedar, Angelly, Venatica, Jarrah Timber, Karri, Blue Gum, Red Gum, Box, Thingam, and Puhutukawa | 10 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 10 | 12 | 10 | 10 | 10 | 12 | Cuba Sabicu, Pencil Cedar, Angelly, Venatica, Jarrah Timber, Karri, Blue Gum, Red Gum, Box, Thingam, and Puhutukawa | 3 |
| 4 | Second-hand English, African, and Live Oak, Adriatic, Italian, Spanish, Portuguese, and French Oak; East-India Teak, Morung Saul, Greenheart, Morra, and Iron Bark *(e)* | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | — | — | — | 7 | 7 | Second-hand English, African, and Live Oak, Adriatic, Italian, Spanish, Portuguese, and French Oak; East-India Teak, Morung Saul, Greenheart, Morra, and Iron Bark *(e)* | 4 |
| 5 | Stringy Bark, and Red Cedar | 8 | 8 | 7 | 7 | 8 | 7 | 7 | 7 | 8 | 12 | 8 | 7 | 7 | 8 | Stringy Bark, and Red Cedar | 5 |
| 6 | Danish Oak, other Continental White Oak, Mahogany of *Hard Texture*, Spanish Chestnut, Flooded Gum, Spotted Gum, Grey Gum, Turpentine, Black Butt, Tulip-wood, Tallow-wood, & Mulberry | *9 | *9 | 9 | 9 | *9 | 9 | *9 | *9 | *9 | *12 | 10 | 10 | 10 | *10 | Danish Oak, other Continental White Oak, Mahogany of *Hard Texture*, Spanish Chestnut, Flooded Gum, Spotted Gum, Grey Gum, Turpentine, Black Butt, Tulip-wood, Tallow-wood, & Mulberry | 6 |
| 7 | North American *White* Oak | *8 | 8 | 8 | 8 | 8 | 8 | 8 | *7 | *9 | *12 | *8 | 8 | 8 | 8 | North American *White* Oak | 7 |
| 8 | Pitch Pine, Oregon Pine, Huon Pine, Cowdie or Kaurie Pine, Larch, Hackmatack, Tamarac, & Juniper | *9 | *9 | 9 | 9 | *9 | 9 | *9 | *9 | *9 *(d)* | *12 | 10 | 10 | *10 | 10 | Pitch Pine, Oregon Pine, Huon Pine, Cowdie or Kaurie Pine, Larch, Hackmatack, Tamarac, & Juniper. | 8 |
| 9 | Dantzic, Memel, Riga, and American Red Pine | *8 | *8 | 8 | 8 | *8 | 8 | *8 | *8 | *6 *(d)* | *9 | 9 | 9 | *10 | 9 | Dantzic, Memel, Riga, and American Red Pine | 9 |
| 10 | English Ash | *8 | *6 | *5 | *5 | *5 | *4 | *5 | *5 | *5 *(d)* | *10 | 5 | — | — | — | English Ash | 10 |
| 11 | Foreign Ash and Rock Maple | *8 | — | — | — | — | — | — | — | — | *8 | 6 | — | — | *5 | Foreign Ash and Rock Maple | 11 |
| 12 | American Rock Elm and Hickory | *7 *(f)* | *6 | 6 | 6 | *7 | 6 | *7 | 6 | *7 | *12 | 7 | 6 | 6 | 7 *(b)* | American Rock Elm and Hickory | 12 |
| 13 | European and American Grey Elm | *6 | *6 | 6 | 6 | 6 | 6 | 6 | 6 | — | *12 | 6 | — | — | — | European and American Grey Elm | 13 |
| 14 | Black Birch and Black Walnut | *7 *(f)* | *6 *(f)* | — | — | — | — | — | — | *6 *(d)* | *10 | 6 | 6 | — | — | Black Birch and Black Walnut | 14 |
| 15 | Spruce Fir, Swedish and Norway Red Pine, and Scotch Fir | *8 | *8 | 8 | 8 | 8 | 8 | 8 | *8 | — | *8 | 8 | 8 | 8 | 8 | Spruce Fir, Swedish and Norway Red Pine, and Scotch Fir | 15 |
| 16 | Beech | *7 *(f)* | *6 | — | — | — | — | — | — | *6 *(d)* | *12 | 6 | — | — | — | Beech | 16 |
| 17 | Yellow Pine | — | — | — | *4 | *4 | *4 | *4 | *4 | — | *6 | *5 | *5 | *5 *(c)* | *5 | Yellow Pine | 17 |

*(a)* This Table applies as to the Deadwood so far as regards the Material to be used from the height of two feet above the rabbet of the Keel.

*(b)* American Rock Elm allowed for Limber Strakes, Bilge Strakes, and Ceiling between them in Ships of the 9 years' grade, and under.

*(c)* Yellow Pine allowed for Waterways of Upper Deck in Ships of the 8 years' grade, and under, if properly fastened, as prescribed in Table B, and provided the Beams are well secured independently of the Waterways.

*(d)* The Materials marked thus *d* under the head of "Rudder and Windlass," allowed in ships of 300 Tons and under *only*.

*(e)* In cases where second-hand Timber of the descriptions named in line No. 4 is proposed to be used, application may be made to the Committee, who will appoint a special survey to be held thereon; and on a report being received of its being of superior quality and of adequate size, a higher grade (not exceeding two years) may be allowed than as above set forth.

*(f)* Black Birch, Beech, and American Rock Elm allowed for Floors amidships to an extent not exceeding three fifths the entire length of the Keel in Ships of the 9 years' grade and under.

Black Birch allowed for First Futtocks amidships to the same extent in Ships of the 8 years' grade.

MEM.—The word "English" includes Timber the growth of the United Kingdom.

☞ **SALTING.** *All* Ships built of the Timber above named, except those built wholly of Teak, will have one year added to their classification, if salted, provided it be done to the satisfaction of the Surveyors and as prescribed in Section 37 of the Rules; but Vessels built of the Materials contained in Lines 6 to 17 inclusive *must* be salted, or one year will be deducted from the term of years assigned on the Table, except where used for those parts indicated by an asterisk, thus: *

*Lloyd's Register of Shipping, London, 4th December*, 1879.

# TABLE C.

SIDING AND MOULDING OF BEAMS.—*Sec.* 41.

| LENGTH OF BEAM *amid-ships.* | HOLD BEAMS | | DECK BEAMS | |
|---|---|---|---|---|
| | sided and moulded. | moulded at ends. | sided and moulded. | moulded at ends. |
| Feet. | Inches. | Inches. | Inches. | Inches. |
| 10 | — | — | $4\frac{1}{2}$ | $3\frac{3}{4}$ |
| 11 | — | — | 5 | 4 |
| 12 | — | — | $5\frac{1}{4}$ | $4\frac{1}{4}$ |
| 13 | — | — | $5\frac{1}{2}$ | $4\frac{1}{2}$ |
| 14 | — | — | $5\frac{3}{4}$ | $4\frac{3}{4}$ |
| 15 | 8 | $6\frac{3}{4}$ | $6\frac{1}{4}$ | $5\frac{1}{4}$ |
| 16 | $8\frac{1}{2}$ | 7 | $6\frac{1}{2}$ | $5\frac{1}{2}$ |
| 17 | $8\frac{3}{4}$ | $7\frac{1}{2}$ | $6\frac{3}{4}$ | $5\frac{1}{2}$ |
| 18 | $9\frac{1}{4}$ | $7\frac{3}{4}$ | 7 | $5\frac{3}{4}$ |
| 19 | $9\frac{1}{2}$ | 8 | $7\frac{1}{4}$ | 6 |
| 20 | 10 | $8\frac{1}{2}$ | $7\frac{1}{2}$ | $6\frac{1}{4}$ |
| 21 | $10\frac{1}{4}$ | $8\frac{3}{4}$ | $7\frac{3}{4}$ | $6\frac{1}{2}$ |
| 22 | $10\frac{1}{2}$ | 9 | 8 | $6\frac{1}{2}$ |
| 23 | 11 | $9\frac{1}{4}$ | $8\frac{1}{4}$ | $6\frac{3}{4}$ |
| 24 | $11\frac{1}{4}$ | $9\frac{1}{2}$ | $8\frac{1}{2}$ | 7 |
| 25 | $11\frac{3}{4}$ | $9\frac{3}{4}$ | $8\frac{1}{2}$ | $7\frac{1}{4}$ |
| 26 | 12 | 10 | $8\frac{3}{4}$ | $7\frac{1}{4}$ |
| 27 | $12\frac{1}{4}$ | $10\frac{1}{4}$ | 9 | $7\frac{1}{2}$ |
| 28 | $12\frac{1}{2}$ | $10\frac{1}{2}$ | 9 | $7\frac{1}{2}$ |
| 29 | $12\frac{3}{4}$ | $10\frac{3}{4}$ | $9\frac{1}{4}$ | $7\frac{3}{4}$ |
| 30 | 13 | 11 | $9\frac{1}{2}$ | 8 |
| 31 | $13\frac{1}{4}$ | $11\frac{1}{4}$ | $9\frac{1}{2}$ | 8 |
| 32 | $13\frac{1}{2}$ | $11\frac{1}{2}$ | $9\frac{3}{4}$ | $8\frac{1}{4}$ |
| 33 | $13\frac{3}{4}$ | $11\frac{1}{2}$ | 10 | $8\frac{1}{4}$ |
| 34 | 14 | $11\frac{3}{4}$ | 10 | $8\frac{1}{2}$ |
| 35 | $14\frac{1}{4}$ | 12 | $10\frac{1}{4}$ | $8\frac{1}{2}$ |
| 36 | $14\frac{1}{2}$ | $12\frac{1}{4}$ | $10\frac{1}{4}$ | $8\frac{1}{2}$ |
| 37 | $14\frac{3}{4}$ | $12\frac{1}{2}$ | $10\frac{1}{2}$ | $8\frac{3}{4}$ |
| 38 | 15 | $12\frac{1}{2}$ | $10\frac{1}{2}$ | $8\frac{3}{4}$ |
| 39 | $15\frac{1}{4}$ | $12\frac{3}{4}$ | $10\frac{1}{2}$ | 9 |
| 40 | $15\frac{1}{2}$ | 13 | $10\frac{3}{4}$ | 9 |

The siding and moulding of *all* the Beams to be the same as those amidships, except those at the *after end* of the Ship, which may be reduced in proportion to their diminished length.

MEM.—When SPRUCE, WHITE CEDAR or YELLOW PINE is used for Beams, the dimensions are to be increased.—*See Rules, Sec.* 40.

N.B.—The size of Orlop Beams to be the mean of the sizes here prescribed.

| TONNAGE ..... | 150 | 1250 | 1350 | 1500 | 1750 | 2000 |
|---|---|---|---|---|---|---|
| *(a)* TIMBER AND SPACE.. | $33\frac{1}{2}$ | $33\frac{1}{2}$ | $33\frac{3}{4}$ | 34 | $34\frac{1}{2}$ | 35 |
| Floors, sided and moulded | $14\frac{3}{4}$ | 15 | $15\frac{1}{4}$ | $15\frac{1}{4}$ | $15\frac{1}{2}$ | $15\frac{3}{4}$ |
| Double Floors, sided and m | $13\frac{3}{4}$ | 14 | $14\frac{1}{4}$ | $14\frac{1}{4}$ | $14\frac{1}{2}$ | $14\frac{3}{4}$ |
| *(b)* 1st Futtocks, sided and r | $13\frac{1}{2}$ | $13\frac{3}{4}$ | $14\frac{1}{4}$ | $14\frac{1}{4}$ | $14\frac{1}{2}$ | $14\frac{3}{4}$ |
| 2nd Futtocks, sided, if squ | $12\frac{1}{2}$ | $12\frac{3}{4}$ | $13\frac{1}{4}$ | $13\frac{1}{4}$ | $13\frac{1}{2}$ | $13\frac{3}{4}$ |
| 3rd Futtocks and Long To | $11\frac{1}{2}$ | $11\frac{3}{4}$ | $12\frac{1}{4}$ | $12\frac{1}{4}$ | $12\frac{1}{2}$ | $12\frac{3}{4}$ |
| Top Timbers (Short) sided | $10\frac{1}{4}$ | $10\frac{1}{2}$ | $10\frac{3}{4}$ | $10\frac{3}{4}$ | 11 | $11\frac{1}{4}$ |
| Top Timbers, moulded at l | $7\frac{1}{2}$ | $7\frac{3}{4}$ | $8\frac{1}{2}$ | $8\frac{1}{2}$ | $8\frac{3}{4}$ | 9 |
| Breasthooks & Wing Trans | $14\frac{3}{4}$ | 15 | $15\frac{1}{4}$ | $15\frac{1}{4}$ | $15\frac{1}{2}$ | 16 |
| *(c)* Keel, Stem, Apron, and S | $15\frac{3}{4}$ | 16 | $16\frac{1}{4}$ | $16\frac{1}{2}$ | $16\frac{3}{4}$ | 17 |
| Keelson, also the Mainpiec Counter upwards, sided | $16\frac{3}{4}$ | 17 | $17\frac{1}{4}$ | $17\frac{1}{2}$ | $17\frac{3}{4}$ | 18 |
| *(d)* Wales ..... | 6 | 6 | $6\frac{1}{4}$ | $6\frac{1}{2}$ | $6\frac{3}{4}$ | 7 |
| *(e)* Bottom Plank, from Keel | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ | $4\frac{3}{4}$ | 5 |
| Sheer Strakes, Topsides, U no Shelf fitted, and Low | $4\frac{3}{4}$ | $4\frac{3}{4}$ | 5 | $5\frac{1}{4}$ | $5\frac{1}{2}$ | $5\frac{1}{2}$ |
| Ceiling below Hold Beam ( | $3\frac{3}{4}$ | 4 | 4 | $4\frac{1}{4}$ | $4\frac{1}{2}$ | $4\frac{1}{2}$ |
| *(f)* Waterway, { Hardwood / { Fir .... | $7\frac{1}{2}$ / 9 | 8 / $9\frac{1}{2}$ | 8 / $9\frac{1}{2}$ | $8\frac{1}{2}$ / $9\frac{1}{2}$ | $8\frac{1}{2}$ / $9\frac{1}{2}$ | 9 / 10 |
| Ceiling betwixt Decks .. | 3 | 3 | 3 | $3\frac{1}{4}$ | $3\frac{1}{2}$ | $3\frac{1}{2}$ |
| Bilge Plank, inside, Thick Floorheads, and Limber S | $5\frac{3}{4}$ | 6 | $6\frac{1}{4}$ | $6\frac{1}{4}$ | $6\frac{1}{2}$ | 7 |
| Lower Deck Clamp wher Spirketting ..... | $5\frac{1}{4}$ | $5\frac{1}{2}$ | $5\frac{1}{2}$ | $5\frac{1}{2}$ | $5\frac{3}{4}$ | 6 |
| Upper Deck Clamp where a | $3\frac{3}{4}$ | 4 | 4 | $4\frac{1}{4}$ | $4\frac{1}{2}$ | 5 |
| Planksheer ..... | 4 | 4 | 4 | $4\frac{1}{4}$ | $4\frac{1}{2}$ | 5 |
| Flat of Upper Deck *(see not* | 4 | 4 | 4 | 4 | 4 | 4 |
| Scarphs of Keelson without | t. in. 7 9 | ft. in. 7 9 | ft. in. 8 0 | ft. in. 8 0 | ft. in. 8 0 | ft. in. 8 0 |
| Ditto, where Rider Keelson | 3 9 | 6 9 | 7 0 | 7 0 | 7 0 | 7 0 |
| Main Piece of Windlass *(see* | 23 | 24 | 24 | 25 | 25 | 27 |

*Upper Decks must be renewed when worn in thickness as follows, viz.*:—When a deck originally 4 inches thick is worn to 3 inches; $3\frac{3}{4}$ inches to $2\frac{3}{4}$ inches; 3 inches to $2\frac{1}{4}$ inches.

For Moulding, see foot note.

*(a)* Should the timber and space ugh Bolts at alternate Timbers, with alternate proportion. *See Rules, Sec.* 39 is no Shelf.

*(b)* When the heels of 1st Foothoo s, Top-gallant forecastles, and raised quarter either with full moulding, or with Cr Vessels of excessive lengths as compared with their moulding at the Keelson, may Floors.

e of windlasses in Steam Ships may be 7/8 of dy of the windlass be not of unusual length.

*Lloyd's Register of Shipping,*
*25th May,* 1871.

(SEE OTHER SIDE.)

# TABLE B.

MINIMUM DIMENSIONS OF TIMBERS KEELSON, KEEL, PLANKING, &c.

| TONNAGE ..... TONS.... | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1050 | 1150 | 1250 | 1350 | 1500 | 1750 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *(a)* TIMBER AND SPACE ..... INCHES.. | 18 | 19 | 20 | 21½ | 23 | 24¼ | 25¾ | 27¼ | 28½ | 30 | 30¼ | 30½ | 31 | 31¼ | 31½ | 31¾ | 32¼ | 32½ | 32¾ | 33¼ | 33½ | 33½ | 33¾ | 34 | 34½ | 35 |
| Floors, sided and moulded at Keelson, if squared ..... | 7 | 7½ | 8 | 8¾ | 9½ | 10¼ | 11 | 11¾ | 12¼ | 13 | 13¼ | 13¼ | 13½ | 13½ | 13¾ | 13¾ | 14 | 14 | 14¼ | 14½ | 14¾ | 15 | 15¼ | 15¼ | 15½ | 15¾ |
| Double Floors, sided and moulded at Keelson, if squared.... | 6 | 6½ | 7 | 7¾ | 8½ | 9¼ | 10 | 10½ | 11¼ | 12 | 12¼ | 12¼ | 12½ | 12½ | 12¾ | 12¾ | 13 | 13 | 13¼ | 13½ | 13¾ | 14 | 14¼ | 14¼ | 14½ | 14¾ |
| *(b)* 1st Futtocks, sided and moulded at Floor Heads, if squared | 6 | 6½ | 7 | 7¾ | 8¼ | 8¾ | 9¼ | 10 | 10½ | 11 | 11¼ | 11½ | 11¾ | 11¾ | 12 | 12¼ | 12¼ | 12½ | 12¾ | 13¼ | 13½ | 13¾ | 14¼ | 14¼ | 14½ | 14¾ |
| 2nd Futtocks, sided, if squared ..... | 5½ | 6 | 6½ | 7 | 7½ | 8 | 8½ | 9 | 9½ | 10 | 10¼ | 10½ | 10¾ | 10¾ | 11 | 11¼ | 11¼ | 11½ | 11¾ | 12¼ | 12½ | 12¾ | 13¼ | 13¼ | 13½ | 13¾ |
| 3rd Futtocks and Long Top Timbers, sided, if squared..... | 5½ | 5¾ | 6 | 6½ | 7 | 7¼ | 7¾ | 8¼ | 8½ | 9 | 9¼ | 9½ | 9¾ | 9¾ | 10 | 10¼ | 10¼ | 10½ | 10¾ | 11¼ | 11½ | 11¾ | 12¼ | 12¼ | 12½ | 12¾ |
| Top Timbers (Short) sided, if squared ..... | .. | .. | .. | .. | .. | .. | .. | .. | .. | 9 | 9¼ | 9¼ | 9¼ | 9½ | 9½ | 9½ | 9¾ | 9¾ | 10 | 10 | 10¼ | 10½ | 10¾ | 10¾ | 11 | 11¼ |
| Top Timbers, moulded at heads, if squared ..... | 4 | 4½ | 4¾ | 5 | 5 | 5¼ | 5½ | 5¾ | 6 | 6 | 6¼ | 6¼ | 6¼ | 6½ | 6¾ | 6¾ | 7 | 7 | 7¼ | 7¼ | 7½ | 7¾ | 8½ | 8½ | 8¾ | 9 |
| Breasthooks & Wing Transom, sided & moulded in the middle | 8 | 8½ | 9 | 9¾ | 10¼ | 10¾ | 11¼ | 12 | 12½ | 13 | 13¼ | 13¼ | 13½ | 13½ | 13¾ | 13¾ | 14 | 14 | 14¼ | 14½ | 14¾ | 15 | 15¼ | 15¼ | 15½ | 16 |
| *(c)* Keel, Stem, Apron, and Sternpost, sided and moulded .... | 8 | 9 | 10 | 10¾ | 11¼ | 11¾ | 12¼ | 13 | 13½ | 14 | 14¼ | 14¼ | 14½ | 14½ | 14¾ | 14¾ | 15 | 15 | 15¼ | 15½ | 15¾ | 16 | 16¼ | 16½ | 16¾ | 17 |
| Keelson, also the Mainpiece of Rudder from lower part of Counter upwards, sided and moulded ..... | 9 | 10 | 11 | 11¾ | 12¼ | 12¾ | 13¼ | 14 | 14½ | 15 | 15¼ | 15¼ | 15½ | 15½ | 15¾ | 15¾ | 16 | 16 | 16¼ | 16½ | 16¾ | 17 | 17¼ | 17½ | 17¾ | 18 |
| *(d)* Wales ..... | 3 | 3½ | 4 | 4¼ | 4¼ | 4½ | 4¾ | 4¾ | 5 | 5 | 5 | 5 | 5¼ | 5¼ | 5¼ | 5½ | 5½ | 5½ | 5¾ | 6 | 6 | 6 | 6¼ | 6½ | 6¾ | 7 |
| *(e)* Bottom Plank, from Keel to Wales..... | 2 | 2¼ | 2½ | 2¾ | 3 | 3¼ | 3½ | 3¾ | 3¾ | 4 | 4 | 4 | 4 | 4 | 4 | 4¼ | 4¼ | 4¼ | 4¼ | 4½ | 4½ | 4½ | 4½ | 4½ | 4¾ | 5 |
| Sheer Strakes, Topsides, Upper Deck Clamp where there is no Shelf fitted, and Lower Deck Clamp with a Shelf .... | 2¼ | 2½ | 3 | 3¼ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4 | 4 | 4 | 4¼ | 4¼ | 4¼ | 4¼ | 4¼ | 4¼ | 4½ | 4¾ | 4¾ | 5 | 5¼ | 5½ | 5½ |
| Ceiling below Hold Beam Clamp ..... .. | 1½ | 1¾ | 2 | 2¼ | 2½ | 2¾ | 2¾ | 2¾ | 3 | 3 | 3 | 3¼ | 3¼ | 3¼ | 3¼ | 3½ | 3½ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4¼ | 4½ | 4½ |
| *(f)* Waterway, { Hardwood..... | 3½ | 4 | 4½ | 5 | 5 | 5½ | 5½ | 6 | 6 | 6½ | 6½ | 6½ | 7 | 7 | 7 | 7 | 7½ | 7½ | 7½ | 7½ | 7½ | 8 | 8 | 8½ | 8½ | 9 |
| Fir ..... | 4 | 4½ | 5 | 5½ | 6 | 6½ | 6½ | 7 | 7½ | 8 | 8 | 8 | 8½ | 8 | 8½ | 8½ | 9 | 9 | 9 | 9 | 9 | 9 | 9½ | 9½ | 9½ | 10 |
| Ceiling betwixt Decks ..... | 1½ | 1¾ | 2 | 2 | 2¼ | 2¼ | 2¼ | 2½ | 2½ | 2½ | 2½ | 2½ | 2½ | 2¾ | 2¾ | 2¾ | 2¾ | 2¾ | 2¾ | 2¾ | 3 | 3 | 3 | 3¼ | 3½ | 3½ |
| Bilge Plank, inside, Thick Strakes over long and short Floorheads, and Limber Strake ..... | 2½ | 3 | 3½ | 3¾ | 3¾ | 4 | 4¼ | 4¼ | 4½ | 4½ | 4½ | 4½ | 4½ | 4½ | 4¾ | 4¾ | 5 | 5 | 5¼ | 5½ | 5¾ | 6 | 6¼ | 6¼ | 6½ | 7 |
| Lower Deck Clamp where there is no shelf fitted, and Spirketting ..... | .. | .. | 3 | 3¼ | 3½ | 3¾ | 4 | 4 | 4¼ | 4½ | 4½ | 4¾ | 4¾ | 4¾ | 4¾ | 4¾ | 5 | 5 | 5 | 5¼ | 5¼ | 5½ | 5½ | 5½ | 5¾ | 6 |
| Upper Deck Clamp where a shelf is also fitted ..... | 2 | 2¼ | 2½ | 2½ | 2¾ | 2¾ | 2¾ | 2¾ | 3 | 3 | 3 | 3¼ | 3¼ | 3¼ | 3¼ | 3½ | 3½ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4¼ | 4½ | 5 |
| Planksheer ..... | 2 | 2¼ | 2½ | 2¾ | 3 | 3¼ | 3½ | 3¾ | 3¾ | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4¼ | 4½ | 5 | |
| Flat of Upper Deck *(see note at side)*..... | 2½ | 2½ | 2½ | 3 | 3 | 3 | 3 | 3 | 3 | 3½ | 3½ | 3½ | 3½ | 3½ | 3½ | 3½ | 3½ | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | |
| Scarphs of Keelson without Rider ..... | ft. in. 4 6 | ft. in. 4 9 | ft. in. 5 0 | ft. in. 5 3 | ft. in. 5 6 | ft. in. 5 10 | ft. in. 6 2 | ft. in. 6 6 | ft. in. 6 9 | ft. in. 7 0 | ft. in. 7 0 | ft. in. 7 0 | ft. in. 7 0 | ft. in. 7 0 | ft. in. 7 3 | ft. in. 7 3 | ft. in. 7 3 | ft. in. 7 3 | ft. in. 7 6 | ft. in. 7 6 | ft. in. 7 9 | ft. in. 7 9 | ft. in. 8 0 | ft. in. 8 0 | ft. in. 8 0 | ft. in. 8 0 |
| Ditto, where Rider Keelson is added, also Scarphs of Keel .. | 4 0 | 4 3 | 4 6 | 4 9 | 5 0 | 5 2 | 5 4 | 5 6 | 5 9 | 6 0 | 6 0 | 6 0 | 6 0 | 6 0 | 6 3 | 6 3 | 6 3 | 6 3 | 6 6 | 6 6 | 6 9 | 6 9 | 7 0 | 7 0 | 7 0 | 7 0 |
| Main Piece of Windlass *(see footnote)* ..... INCHES.. | 12 | 14 | 14 | 15 | 15 | 15 | 16 | 16 | 17 | 17 | 18 | 18 | 19 | 19 | 20 | 21 | 21 | 22 | 22 | 23 | 23 | 24 | 24 | 25 | 25 | 27 |

For Moulding, see foot note.

Mouldings for Keelsons, Wales, and deck-clamps to 2¼ inches; 3 inches to 2½ inches.

Mouldings for Keelsons, Wales, and deck-clamps to 2¾ inches; 3½ inches to 3 inches.

Mouldings for Keelsons, Wales, and deck-clamps to 3¼ inches; 4 inches to 3½ inches.

Mouldings for Keelsons, Wales, and deck-clamps to 3¾ inches; 4½ inches to 4 inches.

Mouldings for Keelsons, Wales, and deck-clamps to 4¼ inches; 5 inches to 4½ inches.

Mouldings for Keelsons, Wales, and deck-clamps to 4¾ inches; 5½ inches to 5 inches.

Mouldings for Keelsons, Wales, and deck-clamps to

## SUGGESTED TABLE, B 2.

FOR THE THICKNESS OF INSIDE PLANK, &c., IN THE CONSTRUCTION OF SHIPS BUILT IN THE BRITISH NORTH AMERICAN COLONIES AND ALL FIR SHIPS WHEREVER BUILT.

| TONNAGE.....Tons | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1050 | 1150 | 1250 | 1350 | 1500 | 1750 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thick Waterway .. .....inches | 5 | 5¼ | 5½ | 6 | 6 | 6½ | 7 | 7½ | 7½ | 8 | 8 | 8½ | 8½ | 9 | 9 | 9½ | 9½ | 10 | 10½ | 11 | 11½ | 12 | 12½ | 13 | 13½ | 14 |
| Spirketing ..... | | | 3 | 3¼ | 3½ | 3¾ | 4 | 4 | 4¼ | 4½ | 4½ | 4¾ | 4¾ | 4¾ | 5 | 5 | 5¼ | 5½ | 5¾ | 5¾ | 6 | 6¼ | 6½ | 6¾ | 6¾ | 7 |
| Ceiling Below Hold Beam Clamp and between Decks ..... | 2 | 2 | 2¼ | 2½ | 2¾ | 3 | 3¼ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4¼ | 4¼ | 4½ | 4½ | 4¾ | 5 | 5 | 5¼ | 5½ | 5¾ | 5¾ | 6 | 6 |
| Bilge Plank (Inside)..... | 2½ | 3 | 3½ | 3¾ | 4 | 4¼ | 4½ | 4¾ | 5 | 5½ | 6 | 6½ | 7 | 7 | 7½ | 8 | 8½ | 9 | 9½ | 10½ | 11½ | 12 | 12½ | 13 | 13½ | 14 |
| Thickstuff over long and short Floorheads, and Limber Strakes..... ..... | 2½ | 2¾ | 3 | 3¼ | 3¼ | 3½ | 3¾ | 4 | 4¼ | 4½ | 4¾ | 5 | 5¼ | 5½ | 5¾ | 6 | 6¼ | 6½ | 6¾ | 7 | 7¼ | 7½ | 7¾ | 8 | 8¼ | 8½ |
| Main Keelsons..... (Rider Keelsons may be two-thirds that of main ditto.) | 9 | 10 | 11 | 11¾ | 12¼ | 12¾ | 13¾ | 14 | 14½ | 15 | 15¼ | 15½ | 15½ | 15½ | 15¾ | 15¾ | 16 | 16 | 16¼ | 16½ | 16¾ | 17 | 17¼ | 17½ | 17¾ | 18 |

2, *White Lion Court, Cornhill,*
*25th May*, 1871.

HIPS BUILT IN THE BRITISH NORTH AMERICAN
VER BUILT.

| 700 | 750 | 800 | 850 | 900 | 950 | 1050 | 1150 | 1250 | 1350 | 1500 | 1750 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 9 | 9½ | 9½ | 10 | 10½ | 11 | 11½ | 12 | 12½ | 13 | 13½ | 14 |
| 4¾ | 5 | 5 | 5¼ | 5½ | 5¾ | 5¾ | 6 | 6¼ | 6½ | 6¾ | 6¾ | 7 |
| 4¼ | 4¼ | 4½ | 4½ | 4¾ | 5 | 5 | 5¼ | 5½ | 5¾ | 5¾ | 6 | 6 |
| 7 | 7½ | 8 | 8½ | 9 | 9½ | 10½ | 11½ | 12 | 12½ | 13 | 13½ | 14 |
| 5½ | 5¾ | 6 | 6¼ | 6½ | 6¾ | 7 | 7¼ | 7½ | 7¾ | 8 | 8¼ | 8½ |
| 15½ | 15¾ | 15¾ | 16 | 16 | 16¼ | 16½ | 16¾ | 17 | 17¼ | 17½ | 17¾ | 18 |

## TABLE D.

SIZES OF BOLTS, PINTLES OF RUDDER, AND TREENAILS. *Section* 46.

| TONNAGE | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 700 | 900 | 1350 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heel-Knee, Stemson, and Deadwood Bolts ..... Inches | 14/16 | 15/16 | 1 | 1 | 1 1/16 | 1 2/16 | 1 2/16 | 1 3/16 | 1 4/16 | 1 4/16 | 1 5/16 | 1 6/16 | 1 8/16 |
| Bolts in Sister Keelsons, Scarphs of Keel (*a*), Arms of Breast Hooks, Pointers, Crutches, Riders, Hanging and Lodging Knees to Hold or Lower Deck Beams (except in and out Throat Bolts of Hanging Knees, which must be larger), also in and out Bolts of Shelf, Clamp, and Waterway of Hold or Lower Deck Beams, and the in and out Throat Bolts of Upper Deck Hanging Knees. | 11/16 | 12/16 | 12/16 | 12/16 | 13/16 | 14/16 | 14/16 | 15/16 | 15/16 | 1 | 1 2/16 | 1 3/16 | 1 4/16 |
| Keelson Bolts (one through Keel at each Floor), Throats of Transoms, Throats of Breasthooks, and Throats of Hanging Knees to Hold or Lower Deck Beams ..... | 12/16 | 13/16 | 14/16 | 14/16 | 15/16 | 1 | 1 | 1 1/16 | 1 2/16 | 1 2/16 | 1 3/16 | 1 4/16 | 1 6/16 |
| Bilge, Limber Strake, and Through Butt Bolts ..... | 9/16 | 10/16 | 10/16 | 11/16 | 11/16 | 12/16 | 12/16 | 13/16 | 13/16 | 14/16 | 14/16 | 15/16 | 1 |
| Other Butt Bolts ..... | 9/16 | 10/16 | 10/16 | 10/16 | 11/16 | 11/16 | 11/16 | 12/16 | 12/16 | 12/16 | 12/16 | 13/16 | 14/16 |
| Bolts through heels of cant timbers at fore and after Deadwood. In and out Bolts of Upper Deck Waterway, Shelf and Clamp, also Arms of Hanging and Lodging Knees, except in and out Throat Bolts of Hanging Knees, which must be larger ..... | 10/16 | 11/16 | 11/16 | 11/16 | 12/16 | 13/16 | 13/16 | 14/16 | 14/16 | 14/16 | 15/16 | 1 | 1 2/16 |
| Pintles of Rudder { The Lower Brace must extend so as to receive not less than Two Bolts on the Planking on each side ..... } | 1 7/8 | 2 | 2 | 2 1/4 | 2 3/8 | 2 1/2 | 2 5/8 | 2 3/4 | 3 | 3 | 3 1/4 | 3 1/2 | 3 1/2 |
| Hardwood Treenails ..... | 1 | 1 | 1 | 1 1/8 | 1 1/8 | 1 1/8 | 1 1/4 | 1 1/4 | 1 1/4 | 1 3/8 | 1 3/8 | 1 3/8 | 1 1/2 |

(*a*) NUMBER OF BOLTS IN SCARPHS OF KEEL:—

In Ships of 150 Tons and under ..... 6 Bolts
" above 150 Tons and under 500 Tons.... 7 do.
" 500 Tons and above ..... 8 do.

} These bolts to be of Copper or Yellow Metal in all cases.

N.B.—Bolts to be through and clenched, as prescribed in *Section* 46, and to be of good quality, well made with suitable heads and be tightly driven.

*Lloyd's Register of Shipping,*
*25th May*, 1871.

## TABLE E.

NUMBER OF HANGING KNEES
*Section* 41.

| Tons. | To Hold Beams. | To Upper Deck Beams. |
|---|---|---|
| | PAIRS. | PAIRS. |
| 150 | — | 4 |
| 200 | 4 | 6 |
| 250 | 5 | 7 |
| 300 | 6 | 8 |
| 350 | 7 | 9 |
| 400 | 8 | 10 |
| 450 | 8 | 11 |
| 500 | 9 | 12 |
| 550 | 9 | 13 |
| 600 | 10 | 14 |
| 650 | 10 | 15 |
| 700 | 11 | 16 |
| 750 | 11 | 17 |
| 800 | 12 | 18 |
| 900 | 13 | 20 |
| 1000 | 14 | 22 |
| 1100 | 15 | 24 |
| 1350 | 17 | 26 |

# TABLE F.

## MINIMUM DIMENSIONS OF IRON KNEES AND KNEE RIDERS FOR BRITISH NORTH AMERICAN BUILT SHIPS AND FIR SHIPS.—*Section 62.*

| TONNAGE .....Tons | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Hanging Knees to Hold or Lower Deck Beams .....Pairs | 3 *(a)* | 4 | 6 | 8 | 9 | Upwards, one Knee Rider to every Beam, or Knees and Riders as per Section 62. | | | | | | | | | | | | | | | | | | | | |
| Number of Hanging Knees to Upper and Middle Deck Beams .....Pairs | 4 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | Upwards, one to every Beam | | | | | | | | | | | |
| Breadth of Knees and Riders to Hold or Lower Deck Beams .....Inches | 3 | 3 | 3 | 3 | 3 | 3 | 3¼ | 3¼ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4¼ | 4¼ | 4½ | 4½ | 4¾ | 4¾ | 5 | 5 | 5¼ | 5¼ | 5½ | 5½ |
| Breadth of Upper Deck Knees, where there are two Decks, and of Middle Deck Knees, where there are three Decks .....Inches | 3 | 3 | 3 | 3 | 3 | 3 | 3¼ | 3¼ | 3½ | 3½ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4¼ | 4¼ | 4½ | 4½ | 4½ | 4½ | 4¾ | 4¾ | 4¾ | 4¾ |
| Thickness of Riders at the joints or butts of the Timbers.....Inches | 1¼ | 1¼ | 1½ | 1½ | 1½ | 1½ | 1¾ | 1¾ | 2 | 2 | 2¼ | 2¼ | 2½ | 2½ | 2¾ | 2¾ | 3 | 3 | 3¼ | 3¼ | 3½ | 3½ | 3½ | 3½ | 3¾ | 3¾ |
| Thickness of Knees to Lower Deck or Hold Beams and Knee Riders at the Angle of the Throat .....Inches | 2½ | 2½ | 2¾ | 2¾ | 3 | 3 | 3¼ | 3¼ | 3½ | 3½ | 3¾ | 3¾ | 4 | 4 | 4¼ | 4¼ | 4½ | 4½ | 4¾ | 4¾ | 5 | 5 | 5¼ | 5¼ | 5½ | 5½ |
| Thickness of Knees to Lower Deck or Hold Beams and Knee Riders at the Throat Bolts..... Inches | 1¾ | 1¾ | 2 | 2 | 2¼ | 2¼ | 2½ | 2½ | 2¾ | 2¾ | 2¾ | 2¾ | 3 | 3 | 3 | 3 | 3¼ | 3¼ | 3¼ | 3¼ | 3½ | 3½ | 3½ | 3½ | 3¾ | 3¾ |
| Thickness of Knees to Upper or Middle Deck at the Throat Bolts ..... Inches *(b)* | 1½ | 1½ | 1¾ | 1¾ | 2 | 2 | 2¼ | 2¼ | 2½ | 2½ | 2½ | 2½ | 2¾ | 2¾ | 2¾ | 2¾ | 3 | 3 | 3 | 3 | 3¼ | 3¼ | 3¼ | 3¼ | 3½ | 3½ |
| Thickness of Hanging Knees (not Riders) at the ends ..... Inches | ⅝ | ⅝ | ¾ | ¾ | ¾ | ¾ | ⅞ | ⅞ | ⅞ | ⅞ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Length of Beam Arms of Knees and Knee Riders for Lower Deck or Hold Beams ..... *(c)* | ft. in. 2 6 | ft. in. 2 6 | ft. in. 2 9 | ft. in. 2 9 | ft. in. 3 0 | ft. in. 3 0 | ft. in. 3 3 | ft. in. 3 3 | ft. in. 3 3 | ft. in. 3 6 | ft. in. 3 6 | ft. in. 3 6 | ft. in. 3 9 | ft. in. 3 9 | ft. in. 3 9 | ft. in. 3 9 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 | ft. in. 4 0 |

NOTE.—The Bolts in all Iron Riders in Hold, to be not more than twenty-one inches apart on the average.

Standards upon the Beams of such Ships are not admitted as substitutes for Hanging Knees below them.

For sizes of Bolts, see Table **D**.

*Lloyd's Register of Shipping,*
*7th March*, 1878.

*(a)* Provided the depth of hold be 13ft. or upwards.

*(b)* Breadth and thickness of Knees for Upper Deck, where there are Three Decks, may be one sixth less.

*(c)* Beam Arms of Upper and Middle Deck Knees, may be three inches shorter than those of the Lower Deck.

Side Arms of Hanging Knees not to be less in length, than one and a half the length of their Beam Arms. "*Jumped Knees*" will not be allowed.

Beam Arms of Knees and Knee Riders, which are 3ft. 6in. in length, to have not less than Four Bolts; and shorter than that length, to have not less than Three Bolts.

Side Arms of all Hanging Knees to have at least One Bolt more than in the Beam Arms.

# LLOYD'S REGISTER

OF

# BRITISH AND FOREIGN SHIPPING.

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SUGGESTIONS

FOR

## THE CONSTRUCTION AND CLASSIFICATION OF COMPOSITE SHIPS.

# SUGGESTIONS FOR THE CONSTRUCTION AND CLASSIFICATION OF COMPOSITE SHIPS.

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# SUGGESTIONS

FOR

# THE CONSTRUCTION AND CLASSIFICATION

OF

# COMPOSITE SHIPS.

All vessels constructed with iron frames, or part iron and wood frames, and wood planking, to be classed A for a term of years,* according to the timber material used in their construction, as set forth in Table I, provided the workmanship be well executed, subject to the surveys and conditions hereinafter stated.†

## VESSELS BUILT UNDER A ROOF.

An additional year will be allowed to vessels built under a substantial and efficient roof, kept in good repair, and which extends on each side beyond the vessel's breadth, and beyond each of her ends to an extent equal to half her midship breadth.

## COPPER OR YELLOW METAL BOLTS.

**Paragraph No. 1.** Two additional years will be allowed to vessels, whether planked with one or two thicknesses, if fastened with wrought copper or yellow metal bolts, from the lower part of keel up to the height of one-fifth of the midship depth of hold, below the upper side of the upper deck and parallel thereto forward and aft, in one, two, or three-decked ships, and below the upper side of the main or tonnage deck in spar-decked ships, but the whole of the fastenings above this height may be of iron, if properly galvanized and dowelled or cemented over.

Such ships to be marked C. F. (*Copper fastened*).

**Paragraph No. 2.** Three additional years will be allowed, provided the whole of the external fastenings from the lower part of keel to the gunwale be of wrought copper or yellow metal bolts, to the entire exclusion of iron.

Such ships to be marked **C.F.** (*Copper fastened*).

## IRON BOLTS AND GALVANIZED IRON BOLTS.

Vessels will be allowed to be fastened with galvanized or plain iron bolts, if efficiently dowelled or cemented over; but the butt bolts, and also those which are used in fastening the fore hood ends before the

* The terms of years assigned to *Composite Ships* on the Character A will expire on the 31st December of the last year of the periods assigned to them.

† *Expunging or withdrawal of Character.—The twelfth, thirteenth, and fourteenth Columns left blank, indicate that the Vessel has never been classed in the Register Book. Three dots ... in Column* 13 *indicate that the Vessel was at one time Classed by this Society, but that the Class has been withdrawn at owner's request. A black line with date under it in Column* 14 *indicates that, at that date, the Vessel,* from reported defects, *was not entitled to a Character in the Register Book. A red line with date under it in this Column indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules.*

iron stem plate, the after hood ends abaft the sternpost plate, extending from the keel up to the height of one-fifth the depth of hold below the upper side of the upper deck, in one, two or three-decked vessels, or below the upper side of the main or tonnage deck in spar-decked vessels, those which fasten the planking to the deadwood, the lower edge of the garboard strakes, and the wood keel, and stem scarphs, must be of wrought copper or yellow metal.

All vessels fastened with galvanized iron to be marked G. I. B. (*Galvanized Iron Bolts*), and with plain iron bolts (I. B.); and in addition all iron-fastened ships will be marked "*Expl. T. S.*" (*Experimental Triennial Survey*).

*All vessels fastened with galvanized or plain iron bolts in the bottom, previous to being sheathed with copper or yellow metal, must be sheathed with wood not less than* $1\frac{1}{4}$*in. thick, wrought hot on the best hair felt, and properly rabbeted into the stem, sternpost, keel, and into the planking at its upper edge; efficiently fastened to the bottom planks with yellow metal or copper nails, arranged to come between the frames, and be well caulked. The condition of the bolts and caulking of the bottom and planking to be ascertained at the periodical Surveys as per* Section 43. *The wood sheathing to be allowed to remain on the bottom as long as the bottom planks, bolts, and caulking prove satisfactory.*

## SURVEYS WHILE BUILDING.

### SPECIAL SURVEY.

**Section 1.** 1. The Surveyors are to examine the whole of the materials and the workmanship as it progresses, from the laying of the keel to the completion of the vessel, and to point out as early as possible anything that may be objectionable.

2. In steam vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

### COMMON SURVEY.

**Section 2.** First.—Examination of the wood keel, stem, sternpost, deadwood, and frames before they are painted or coated.

Second.—Of all the beams, stringers, plates, &c., when in place, riveted-up ready to receive the planking.

Third.—When the vessel is planked outside, dubbed fair, and all the fastenings completed, but before she is either caulked, coated, or cemented, so that the inside and outside of the planking, and the bolts and their nuts, may be carefully examined.

Fourth.—When the vessel is caulked, but before the bolt-heads are cemented or have dowels fitted over them.

Fifth.—When the vessel is completed, launched, and equipped.

## SUGGESTIONS AS TO THE BUILDING OF COMPOSITE SHIPS.

### QUALITY OF IRON, MAKER'S NAME, AND WORKMANSHIP.

**Section 3.** 1. The whole of the iron to be of good malleable quality, to be capable of bearing a longitudinal strain of twenty tons per square inch, and all plate, beam, and angle iron, to be legibly stamped in not less than two places with the manufacturer's trade mark, or his name, and the place where made, which is also to be stated in the Report of Survey.

2. Any brittle or inferior iron, defective planking, timber, or other objectionable materials to be rejected.

3. The workmanship to be well executed, and submitted to the closest inspection before coating or painting.

## RIVETS AND RIVETING.

**Section 4.** 1. The rivets to be of the best quality, and to be of the diameter as per Table H, the rivet holes to be regularly and equally spaced, and carefully punched opposite each other in the adjoining parts from the faying surfaces in the laps, lining pieces, butt-straps, and frames, and to be countersunk where required; the rivets not to be nearer to the butts or edges of the plating, lining pieces to butts, or of any angle iron, than a space equal to their own diameter, and not to be further apart from centre to centre than five times their diameter, or nearer than four times their diameter from centre to centre, and to be spaced through the frames and outside plating, and in reversed angle iron a distance equal to nine times their diameter from centre to centre.

2. All butts of iron plating, excepting those of poops and top-gallant forecastles, to be at least double riveted, and a space equal to twice the diameter of the rivets to be between each row; where treble riveting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row.

## SCANTLINGS.

**Section 5.** 1. The scantlings given in Table H are intended for ships the length of which, measured from the fore part of stem to the after part of the sternpost, on the range of the upper deck, does not exceed ten times their depth of hold, taken from the upper part of the floors to the top of the upper deck beams, or seven times their moulded breadth.

2. In vessels exceeding ten depths, or seven breadths in length, the builders are to submit their plans for giving them additional longitudinal strength to the Committee, through the Resident Surveyors, who are to express their opinions thereon.

3. The depth for defining the proportions of spar-decked vessels is to be measured from the top of the floor-plates to the upper side of the middle or tonnage deck beams. (*See* Section 24.)

## WOOD KEEL.

**Section 6.** The wood keel to be of the dimensions set forth in Table H, to be free from all defects, the scarphs to be either vertical or horizontal, and to be tabled, the width of the tabling to be one-third the siding or moulding of the keel, as the case may be, and from $\frac{3}{4}$ of an inch to $1\frac{1}{4}$ inch deep, according to the size of the keel, and bolted with copper or yellow metal bolts, which are to be driven on and clenched on rings of the same metal; the bolts are to be in size and number as required by Table K.

## GARBOARD STRAKE.

**Section 7.** The garboard strakes not to be less than two-thirds the depth of keel prescribed in Table H, and properly rabbeted into it, to be fitted closely to the iron keel plate, and to be of sufficient width. The butts of the garboard strake to have not less than four feet six inches shift from the butts of the garboard strake on the opposite side of the vessel, nor less than the same shift clear of the keel scarphs. (For bolting, *see* Section 33.)

## STEM AND STERNPOST.

**Section 8.** The stem and sternpost to be of the dimensions set forth in Table H, and of materials according to class as prescribed in Table I. Where necessary to scarph the stem, it must be a flat scarph, and its length not less than seven-tenths of that prescribed in Table K for keel scarphs, and tabled and bolted in the same manner. The hood ends to be well and efficiently rabbeted into the stem and sternpost.

## APRON, INNER STERNPOST, AND DEADWOOD.

**Section 9.** The apron, inner sternpost, and deadwood, to be of materials according to class as prescribed in Table I; the apron and inner sternpost to be of sufficient siding and moulding for the knight-heads and counter timbers respectively, to be secured to them, and to take the hood end fastenings.

## SPACING OF IRON FRAMES.

**Section 10.** The spacing of the iron frames not to exceed 18 inches from moulding edge to moulding edge all fore and aft; a four feet length of angle iron, the size of the frame, is to be riveted to each floor and to the keel plate, back to back with the frame.

## KEEL PLATE.

**Section 11.** The keel plate to be of the breadth and thickness prescribed in Table H, and to be made continuous up the apron and up the inner sternpost as high as practicable, but in all cases to extend above the lower deck or hold beam stringer angle iron. Forward and aft the plate is to be curved to the form of the bearding line, and to be one-sixteenth of an inch thicker than prescribed in the Table, where it passes over the deadwoods, apron, and inner sternpost; and to be sided as required by the form of the vessel, to have an angle iron of the size given in Table H for stringer angle irons riveted on each edge, flanged to the form of the vessel to receive the plank fastenings. The keel plate to maintain its breadth for three-fifths the length of the keel in midships, and then to be gradually reduced until its edges conform with the flange of the angle iron on the keel plate forward and aft; the butts of the keel plates to be shifted clear of the keel scarphs.

## FRAMES.

**Section 12.** The frames to be of the dimensions set forth in Table H, and the narrow flange to be of a parallel thickness, and the bolts are to be so placed that the nuts of the screw bolts may fit closely to the frames; the frames to be in as long lengths as possible, fitted and riveted on to the keel plate, and extended as near to the middle line as practicable, according to the plan of construction adopted, and in all cases to extend to the gunwale, and where raised quarter decks, poops, forecastles, and spar decks are construced to extend to their deck stringers respectively, except when constructed of a rounded form at the gunwale, then they may terminate at the lower part of the curve; if the frames be welded, the welds to be perfect with not less than four feet shifts from the welds of next frames, or, if butted, to have not less than four feet shifts with four feet lengths of angle iron of the same size as the frames fitted back to back, riveted to them, and secured to the outside planking.

## FLOOR-PLATES.

**Section 13.** 1. The floor plates to be in thickness according to Table H, but at each end of the vessel, for one quarter of her length, they may be reduced one-sixteenth of an inch where the midship

floor-plates are six-sixteenths and under ten-sixteenths of an inch, and two-sixteenths of an inch where the plates are ten-sixteenths and above in thickness.

2. The depth of the floor-plates at middle line to be regulated by the following rule, viz., to the vessel's depth, measured from the top of the keel to the top of the upper or spar deck beams amidships add the extreme breadth of the vessel, two-fifths of that sum in inches to be the depth of the floor-plates at the middle line well fore and aft, but at the extreme fore and after ends they must be deeper, so as to form an efficient connection between the two sides of the vessel.

3. The floor-plates are to extend up the bilges not less than to a perpendicular height of *twice* and *a half* the depth of floors amidships, from upper side of keel at middle line; and in no case to be less moulded in any part than a fair taper between the depth at middle line, and the moulding at their extreme ends, which is to be not less than the moulding of the frames. The ends of the floors to maintain the height prescribed amidships, for one quarter of the vessel's length; they may then be gradually lowered forward and aft until the upper edges of the floor-plates are level, which place is to be determined by the form of the vessel, and from that point to the vessel's ends they are to be gradually increased in depth, so as to efficiently connect the sides of the vessel; the upper parts of the floors forward and aft are to be high enough to give ample room between the reverse frames on each side of the vessel for fitting the keelson angle irons.

4. In vessels having considerable rise of floor, the depth of the floor-plates on a square at the quarter of the vessel's extreme moulded breadth, set out from the middle line, is to be not less than three-fifths the depth of the floor-plate at the middle line, and the floor-plate is to be extended up the bilges by a fair taper from middle line, until it terminates at the moulding of the frames.

5. A floor-plate to be fitted and riveted to every frame and to be extended across the middle line, but, where a vertical centre plate is adopted at middle line, then the floor-plates are to be efficiently connected to it on each side by double vertical angle irons of not less size than the reversed frames.

6. When floors extend from side to side, and are made in two lengths, the butts are to have double butt-straps, one on each side of the floor-plates, and three-fourths the thickness of the floor-plates, or else the floor-plates must be lapped and treble riveted.

## WATERCOURSES.

**Section 14.** Watercourses are to be formed through all the floor-plates, on each side of the middle line, and at the bilges above the frames, so as to allow water to reach the pumps freely, and also through the vertical centre plate, and intercostal keelsons when such keelsons are adopted.

## REVERSED FRAMES.

**Section 15.** Reversed angle irons on frames to be in size as per Table H. All vessels under 200 tons to have reversed angle iron riveted to every frame and floor-plate across the middle line, extended to the height of the upper part of the bilge, and to the gunwale on alternate frames, and to have double reversed angle irons in way of all keelsons and stringers in hold; and in addition all vessels of 200 tons and upwards to have reversed angle iron extended to the upper deck beam stringer on alternate frames, and, where raised quarter decks and spar decks are constructed, to their deck stringers respectively, except when constructed of a rounded form at the gunwale, then they may terminate at the lower part of the

curve ; and on the remaining frames reversed angle irons are to be fitted to above the height of the lower deck or hold beam stringer angle iron if the vessel has two decks or tiers of beams, and to above the height of the middle deck beam stringer angle iron if the vessel has three decks or tiers of beams ; the rivets for securing the reversed angle iron to the frames and floor-plates to be in diameter as specified in Table H, and be spaced not to exceed a distance of nine times their own diameter from centre to centre ; butts of reversed angle iron to be secured with butt-straps.

### MIDDLE LINE KEELSON.

**Section 16.** 1. The middle line keelson, if of single plate, and standing above the floor-plates, to be of the thickness prescribed in Table H, to be two-thirds of the depth of floor-plates, and to have an angle iron, of the size given in Table H, fitted and riveted on *each* side, top and bottom, extending all fore and aft, the bottom angle irons to be riveted to a foundation plate the breadth of which is to be not less than three and a half times the flange of the angle iron fitted upon it, and the top angle irons to a rider plate on the top, the breadth of which is to be not less than the breadths of the flanges of the angle irons attached to them and the thickness of the keelson plates combined, to be properly shifted, and to be of the thickness given in Table H for box keelson plates, and the lower plates to be riveted to double reversed angle irons attached to each of the floors ; but the foundation plate may be dispensed with if the combined widths of the horizontal flanges of the bottom angle irons are equal to the breadth prescribed for the foundation plate, and double riveted to the angle irons on the floors.

### BOX KEELSON.

2. If a box keelson be adopted, it is to be formed of plates, properly shifted, of the thickness given in Table H, with a foundation plate, the depth of the box to be not less than two-thirds the depth of the floor-plates, and the breadth of it two-thirds of its depth ; the lower angle irons of the box keelson to be of the size given for the frames, and the top ones the size of the reversed frames, and the keelson to be well stayed in way of the masts.

### INTERCOSTAL KEELSON.

3. If an intercostal keelson be adopted, it is to be of the thickness prescribed in Table H, and riveted to vertical angle irons of not less size than the reversed frames attached to all floor-plates, the plates to extend from the keel plate to the top of the floors, a bulb plate of not less thickness than the lower deck beams, or other bars of equal strength, to be let down below the top of the floors sufficiently for the intercostal plates to be riveted to them ; in all cases these bars are to be fitted between two longitudinal angle irons on the floors, extending all fore and aft, of the size given for keelson angle iron in Table H, and riveted thereto. The intercostal plates to be fitted close to the floors, and to the flat keel plate.

### VERTICAL CENTRE PLATE.

4. If the middle line keelson be formed of a vertical centre plate, extending from the keel plate to the top of the floors, it must be not less in thickness than that given in Table H, riveted to two fore and aft angle irons of the size given for stringer angle irons in Table H, attached to the keel plate. To strengthen the floor-plates transversely at their intersection at the middle line, in addition to double vertical angle irons, of not less size than the reversed frames, riveted to their ends, and to the vertical centre plate, there is to be a flat keelson plate of the same breadth and thickness as to the keel plate, riveted to double reversed

angle irons on the upper edge of floors, and to two fore and aft angle irons of the size given for stringer angle irons in Table H, on the top edge of the vertical centre plate; but, should the vertical centre plate be extended above the upper edge of the floors, then it is to be riveted to two fore and aft angle irons of the size given in Table H, for stringer angle irons, and to *two* flat plates of the thickness given for box keelson plates, and half the breadth of the keel plates, one on each side of the middle line, which are to be well riveted to double reversed angle irons on the top of each floor, one of these reversed angle irons to reeve through the vertical centre plate, and in all cases the vertical centre plate to be extended to the stem and sternpost plates, and riveted thereto.

## BILGE KEELSONS AND STRINGERS.

**Section 17.** 1. All vessels to have bilge keelsons fitted and riveted to double reversed angle irons to each floor, secured in an efficient manner, and to extend all fore and aft, and placed at the lower turn of the bilges according to the form of the bottom; to be formed of double angle irons of the size given in Table H, with bulb plate not less than the size given for hold beams fitted between them for one-half the length of the vessel in midships; and in addition, in vessels of 300 tons and under 700 tons, a stringer will be required between the bilge keelson and hold beams, formed of double angle irons back to back, well riveted to double reversed angle irons and to each other; at the fore and after ends of the vessel the bilge keelson and stringer angle irons to be efficiently connected by plates forming hooks and crutches, which are to be properly riveted to the apron and inner sternpost plates; and such vessels to have intercostal plates fitted midway betwen the main and bilge keelsons, for three-fifths the vessel's length of keel in midships, these plates to be the thickness of the floor-plates, and connected thereto with angle irons of the size of the reversed frames.

2. In vessels of 700 tons and under 1,000 tons, in addition to the foregoing, a bulb plate, not less in thickness than the hold beams, is to be let down and riveted to the side intercostal plates, to be inserted between double angle irons on the top of the floors of the size given for stringer angle irons in Table H, and to be extended for three-fifths the length of the keel in midships, but the double angle irons to extend as far forward and aft as practicable.

3. In vessels of 1,000 tons and upwards, of a depth not requiring orlop beams, in addition to the foregoing, another stringer must be introduced formed of double angle irons fitted back to back to extend fore and aft, and riveted to double reversed angle irons and to each other; this stringer and the one below it are to be arranged so as to be equally spaced between the bilge keelson and hold beams, and a foundation plate, of the same thickness as the floors, is to be fitted for three-fifths the vessel's length of keel amidships under the bilge keelson, to be riveted to double reversed frames to the floors, and to which the bilge keelson is to be riveted. The breadth of the foundation plate is not to be less than three and a half times the flange of the angle iron fitted upon it.

4. Where bulb iron is use for keelsons or stringers, the joins to be overlapped and riveted; the length of the overlap must not be less than the depth of the bulb plate, but iron of other form than bulb may be used for them if of equal strength.

5. All angle irons for keelsons and stringers are to be in as long lengths as possible, properly shifted, and wherever butted to be connected with angle iron or plate iron not less than two feet long, fitted in the throat of them, properly riveted to each flange, and the thickness of the connecting plates not to be less than the angle irons they connect.

## SPACING OF BEAMS.

**Section 18.** 1. The spacing of the upper deck beams in no case to exceed 4 feet 6 inches from centre to centre.

2. Vessels of 11 feet depth of hold and under, to have a stringer formed of double angle irons back to back, of the size given in Table H, placed midway between the bilge keelson and deck beams, fitted and riveted to reversed angle iron attached to each frame, to extend all fore and aft, and connected by plates at the ends forming hook and crutch, which are to be secured to the apron and inner sternpost.

3. Vessels over 11 and under 13 feet depth of hold to have a hold beam stringer plate of the same thickness as the upper deck stringer plate, but only two-thirds its breadth, efficiently secured to the side by an angle iron riveted to it and to the reversed frames of the size given in Table H for stringer angle iron, to extend all fore and aft, and to be properly connected at the fore and after ends. Bracket or knee plates to be fitted and riveted to the stringers at alternate frames on the under side, and the inner edge of the stringer plate to be stiffened by an angle iron of the same size as given for the reversed angle iron on the frames; or, if preferred, a stringer may be formed of bulb plate of the size given for hold beams fitted between two stringer angle irons, passing all fore and aft, properly riveted to double reversed angle iron on the frames, and to each other, or a stringer may be introduced of any other form of equal strength.

4. Vessels of 13 feet and under 15 feet depth of hold to have a hold beam under every alternate upper deck beam.

5. Vessels of 15 feet depth of hold and under 18 feet to have hold or lower deck beams spaced not more than 4 feet 6 inches, and 9 feet from centre to centre alternately, and always to be placed under upper deck beams.

6. And, in vessels of 18 feet depth of hold and above, a hold or lower deck beam to be placed under every upper deck beam.

## PANTING (TO PREVENT).

7. In vessels exceeding 12 feet in depth from the lower side of the lower deck beams, and having fine ends, extra beams will be required both forward and aft between the lower deck beams and floors to prevent "panting," the sizes, arrangement, and security of them to be to the satisfaction of the Surveyors.

## TWO-DECKED VESSELS WITH ORLOP BEAMS.

8. All two-decked vessels exceeding 24 feet in depth from the top of the floors to the upper side of the upper deck beams, and three-decked vessels exceeding 24 feet to the upper side of the middle deck beams, and where the depth from the under side of the lower deck beams exceeds 15 feet, such vessels to have orlop beams under every second lower deck beam with a stringer plate on their ends, of the same breadth and thickness as the lower deck stringer, passing all fore and aft, supported by brackets riveted to every other frame between the beams; the orlop beams to be secured to lugs welded to the lower deck beam pillars; but, in the case of flush-deck ships, a depth of 25 feet will be allowed, provided the lower hold does not exceed 16 feet in depth from the under side of lower deck beams. Should a house be constructed on such flush-deck ship, for lodging crew or for store room, the same not to extend within 10 feet of the sternpost.

## THREE-DECKED VESSELS.

9. In vessels having three decks, viz., upper, middle, and lower, and where cargo may be carried on the middle and lower decks, the beams, iron sheerstrake, upper deck stringers, and stringer angle irons and flat of upper deck are to bear the same proportion to the vessel's dimensions as in those having two decks, and the middle and lower deck beams, and stringers, are to be of the same size in proportion to the vessel's length and breadth, as they would be in the lower deck of a vessel having only two decks; but one-sixth reduction will be allowed in the thickness of the outside planking, for one-fifth of the depth of hold below the upper deck stringer.

10. In all cases the middle deck is to be perfectly laid and caulked.

## BEAMS.

**Section 19.** 1. Beams to be of bulb plate with double angle irons on the top edge, or of T bulb iron, or of any other approved form of equal strength.

2. The upper deck beams to be one quarter of an inch in depth to every foot in length of the midship beam, and to be in thickness one-sixteenth of an inch for every inch in depth, with one-sixteenth of an inch added; if of T bulb, the united breadth of the top flanges to be not less than three-fourths the depth of the beam, and, where beams are formed of bulb plate with double angle irons on the top edge, the flanges of each of the angle irons are not to be less in their united breadth than three-fourths the depth of the beam, and to be one-sixteenth of an inch in thickness for every inch of the two sides of the angle iron.

## MIDDLE-DECK, HOLD, AND ORLOP BEAMS.

3. Middle-deck, hold, and orlop beams to be one-eighth of the depth deeper, and one-sixteenth of an inch thicker than the upper deck beams.

4. All beams to be efficiently connected to the frames by bracket ends, or knee plates, the arms of each to be not less than twice and a half the depth of the beams in length, and of not less thickness than the beams.

## PILLARS.

**Section 20.** All beams for at least three-quarters the length of the vessel in midships to be pillared, and in addition, the beams under the bowsprit, pall bitt, windlass, and capstan are to be pillared; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper deck, or spar deck, and to be of the sizes given in Table H.

## ENGINE-ROOM AND BOILER SPACE.

**Section 21.** In the construction of steam vessels, care must be taken that the engine and boiler bearers are properly constructed, and where they might interfere with the longitudinal strength of the vessel they must be extended a sufficient distance beyond the engine and boiler space to compensate for such interruption; and, after the machinery and boilers are fitted, as many hold or lower deck beams are to be introduced as may be practicable, and knee or bracket plates are to be added and riveted to the stringer plates, and to alternate frames which have no beams in the said space, and the vessel is to be otherwise made secure where necessary in the engine room, to the satisfaction of the Surveyors.

## RAISED QUARTER-DECKS.

**Section 22.** 1. The frames in all cases, and reversed angle iron on alternate frames, where practicable, are to extend to the raised quarter-deck stringer.

2. A reduction of one-half in the breadth and one-fifth in the thickness will be allowed for the sheerstrake of the raised quarter deck, and one-fifth in the scantlings of the beams, stringers, stringer angle iron, and flat of deck of raised quarter-deck, from that given in Table H for the upper deck of such ships; one-fifth reduction will also be allowed for the outside planking, or plating, of the raised quarter deck from that given for topsides in Table H.

3. The upper deck beam stringer plate is to maintain its breadth to the break of the quarter deck, and then it may be gradually reduced in breadth until it terminates at the sixth frame abaft the break, and the upper deck sheerstrake plate is to extend to the stern.

## POOPS AND FORECASTLES.

**Section 23.** 1. In full poops and top-gallant forecastles, the frames are to be extended to their stringer plates; a reduction of one-fourth will be allowed from the dimensions required by Table H for the upper deck sheerstrake, stringer plate, angle iron on stringers, beams, and flat of deck; the same reduction will be allowed for the outside planking, or plating, of the poop or forecastle, from the thickness given for topsides in Table H; where plating alone is adopted, it need not in any case exceed six-sixteenths of an inch in thickness, and may be single riveted. An iron or wood spirketting to be fitted and efficiently secured and caulked in the poop and forecastle, to prevent water from going into the 'tween decks. The united lengths of poop and forecastle not to exceed three-fifths of the entire length of the upper deck.

2. Where the poop or the forecastle is constructed of a rounded form at the gunwale, the frames need not extend beyond the lower part of the curve, and the beams may be of plain angle iron not less in dimensions than the size required in Table H for the main frames, one to be placed to every alternate frame, to scarph the main frames with not less than two-feet lengths and be properly riveted to them; the breast beams are not to be less in size than the angle iron for stringers prescribed in table H, with an angle iron of the size of the reversed frames riveted to them, and the rounded gunwale when not intended to be planked over, its plating must be of the thickness required for sheerstrakes of poops; but, when intended to be planked over, the thickness prescribed for the stringer plates on beams of poops will be sufficient; in either case the plating must extend the breadth of the rounded form, and in such cases stringers on beam ends will not be required.

## TONNAGE, HAVING REFERENCE TO SCANTLINGS, &c.

3. In flush-decked vessels having either one, two, or three decks (not being spar or awning decked) the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull and also the equipment of the vessel.

4. In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, or awning deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull; but the register tonnage, as cut on the main beam of sailing vessels and of steam vesels, *with the*

*addition of the tonnage of the space required for propelling power*, is to regulate the equipment, and also the size of the main piece of rudder and windlass, and the keel and keelsons and their number, and the scantling of the stringer plates on the upper and lower deck beams, and the requirements as to double riveting.

5. But, in vessels where the tonnage of the erections above the tonnage deck is less than that required for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage cut on the main beam, for the tonnage that is to regulate the equipment and the size of the main piece of rudder and windlass, and the keel and keelsons and their number, the scantling of the stringer plates on the upper and lower deck beams, and the requirements for double riveting.

## SPAR-DECKED VESSELS.

**Section 24.** 1. A spar-decked vessel is one having three decks or tiers of beams, where the space between the main and the spar deck is to be used only for the accommodation of crew and passengers, or to enclose the engine openings of steam vessels. The total depth of such vessels, measured from the top of floor-plates to the top of spar deck beams in midships, must not exceed thirteen-sixteenths, nor be less than twelve-sixteenths of the ship's extreme breadth. All frames and reverse angle irons on alternate frames are to extend to the spar deck stringer plate, except when constructed with a rounded form at the gunwale, then they may terminate at the lower part of the curve, but the reverse angle irons on the remaining frames are required to extend above the height of the main deck waterway or spirketting; in such ships the gross tonnage below the main or tonnage deck is to regulate all scantlings below this deck, but the total tonnage is to regulate the scantlings of the keelsons and their number, the stringers in the hold, the size of the main piece of rudder, and windlass.

2. These vessels are to have a main or middle complete deck, perfectly laid and caulked, and a main or middle deck iron sheerstrake, each of the thickness prescribed by Table H, and the main deck stringer plate is to be fitted and connected to the iron sheerstrake by angle iron between the frames of the size given for stringers, and in addition an inner stringer angle iron passing continuously fore and aft must be riveted to the reversed frames and to the main deck stringer plate. The upper part of the sheerstrake is to be not less in height than the main deck waterway or spirketting, as the case may be, and the space between the waterway, or spirketting, and the sheerstrake, all fore and aft, is to be filled in and made water-tight.

3. In such vessels a reduction of one-fourth from the dimensions required by Table H for the corresponding parts in the range of the upper deck in ships with two decks will be allowed from the dimensions of all beams, stringers, thickness of deck, and the outside planking, or plating, from the main deck upwards. If plating alone be adopted between the main and spar decks, the thickness need not exceed six-sixteenths of an inch in any case, the butts to be *double* riveted, but the edges may be single riveted.

4. When the spar deck is constructed of a rounded form at the gunwale, the beams may be of plain angle iron, if fitted to alternate frames, not less in dimensions than the sizes required in Table H for the main frames, to scarph the main frames with not less than two-feet lengths, and be properly riveted to them. All hatchway and mast beams are to be of increased strength, and if of plain angle iron not to

be less than the sizes given for stringer angle irons in Table H, with other angle irons of the size of the reversed frames riveted to them back to back. The rounded gunwale to be plated and properly constructed to the satisfaction of the Surveyor.

5. Deck houses or other erections will be allowed on a spar deck, but only to the extent of one-tenth its total superficial area; they are not to exceed seven feet in height, nor be placed nearer to either end of the vessel than one-fifth of her extreme length.

6. Vessels to which the Rule applies as regards an entire spar deck, will be noted in the Register Book thus, "*Spar deck.*"

## EQUIPMENT.

1. The tonnage, as per Section 32 of Rules for Wood Ships, is to regulate the equipment. (*See* Sections 72 to 78 of the Rules for Wood Ships, also Table No. 22.)

2. The boilers and machinery are to be considered as part of the equipment, and, unless the Surveyors are satisfied of their efficiency, the figure 1 will be withheld, and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules.

## STEAM SHIPS.—BOILERS AND MACHINERY.

1. In new vessels propelled by steam, and in vessels fitted with new engines or boilers, the machinery is to be submitted to the inspection of the Society's Engineer-Surveyors, who will furnish a report to the Committee describing them, in the manner and form, No. 8 annexed. The Committee will thereupon, if found satisfactory, grant a certificate, and insert in the Register Book the notification, "L.MC." *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE), indicating that the machinery and boilers are certified to be in good order and safe working condition.

2. If the machinery or boilers are Specially Surveyed during their construction, a distinguishing mark ✠ in red is added, thus: "✠L.MC.," or "✠NE.&B.85," or "✠NB.85."

3. In order to facilitate this inspection, the plans of the *machinery and boilers* should be examined, and from them the working pressure fixed.

4. In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions (*see* Circular, No. 438,* page 123):—

1. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82° Fahrenheit.
2. Steel rivets are to be considered as part of the material, and, in addition to being subjected to a shearing test, they must be capable of withstanding the same test as the plates are required to undergo.

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the construction of boilers.
4. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.
5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.
6. No steel stays are to be welded.
7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

5. The Surveyors will be guided in fixing the working pressure by the *tables and formulæ* annexed.

6. Any novelty in the construction of the machinery or boilers to be reported to the Committee.

7. The boilers, together with the machinery, to be inspected at different stages of construction.

8. The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice the working pressure, and carefully gauged while under test.

9. Two safety valves to be fitted to each boiler and loaded to the working pressure in the presence of the Surveyor. If common valves are used, their combined areas to be at least half a square inch to each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor, the accumulation in no case to exceed 10 per cent. of the working pressure.

10. An improved safety valve also to be fitted to the superheater.

11. In winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

12. Each valve to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety valve spindles to extend through the covers and be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

13. Stop valves to be fitted so that each boiler can be worked separately.

14. Each boiler to be fitted with a separate steam gauge, to accurately indicate the pressure.

15. Each boiler to be fitted with a blow-off cock independent of that communicating with the sea.

16. The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyors.

17. Gauges of an improved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

18. The engines are to be fitted with two feed pumps each capable of supplying the boilers; the pumps, &c., to be so arranged that either can be overhauled whilst the other is at work.

19. The engines are to be fitted with two bilge pumps, which are to be so arranged that either can be overhauled whilst the other is at work.

20. In engines of 70 H.P. and under, one feed pump and one bilge pump will be deemed sufficient, provided they are of adequate capacity.

21. A bilge injection or a bilge suction to the circulating pump is to be fitted.

22. Engine bilge pumps are to be so fitted as to pump from each compartment of the vessel. The

roses in engine-room and mud boxes to be placed in positions where they are easily accessible, and to be to the satisfaction of the Surveyors.

23. A donkey pump is to be provided capable of supplying the boilers with water. A donkey is to be so fitted as to pump from each compartment, to deliver water on deck, and, if no hand pump is fitted in engine-room, it must be fitted to be worked by hand.

24. All steam and feed pipes are to be of copper, of a thickness to the satisfaction of the Surveyors.

25. All discharge pipes to be, if possible, carried above the deep load line, and to have discharge-valves fitted in an *accessible position.*

26. No pipes to be carried through the bunkers without being properly protected.

27. Bilge suction pipes to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

## COCKS, PIPES, AND SEA CONNECTIONS.

28. With a view to ensuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows in all new vessels and in vessels having new engines or boilers, viz. :—

29. All sea-cocks to be attached to Kingston valves of a height sufficient to lift them up to the level of platforms.

30. Cocks and valves connecting all suction pipes to be fixed above the stoke-hold and engine-room platforms.

31. The arrangement of pumps, bilge injections, suction and delivery pipes, to be such as will not permit of water being run fron the sea into the vessel by an act of carelessness or neglect. Any defective arrangement to be reported to the Committee.

## SPARE GEAR.

32. The articles of spare gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz.:

2 connecting-rod top end bolts and nuts,
2 connecting-rod bottom end bolts and nuts,
2 main-bearing bolts,
1 set of coupling bolts,
1 set of feed and bilge pump valves,
1 set of piston springs (where common springs are used),
A quantity of assorted bolts and nuts,
Iron of various sizes.

33. In addition to the foregoing, the following articles are recommended to be carried with a view to expedite repairs and lessen delay in distant ports, viz. :—

Crank shaft,
Propeller shaft,
Propeller, or a full set of blades,
Stern-bush, or lignum-vitæ lining for bush,
Air pump rod,
Circulating pump rod,
H. P. valve spindle,
L. P. valve spindle,
1 set of check valves,
1 pair of connecting rod brasses,
1 pair of cross-head brasses,
1 set of link brasses,
1 cylinder escape valve and spring,
1 eccentric strip complete,
6 junk ring bolts,
6 cylinder cover bolts,
4 valve chest cover bolts,
2 dozen boiler tubes,
3 dozen condenser tubes,
1 set of safety valve springs.

**PERIODICAL SURVEYS OF MACHINERY, ENGINES AND BOILERS** (*See* N.B. at foot.)

34. The machinery and boilers of all steam ships are to be surveyed annually if practicable, and, in addition are to be submitted to a Special Survey every four years upon the occasion of the vessels undergoing the Special periodical Surveys, Nos. 1, 2, and 3, prescribed in the Rules.

35. At these Special Surveys the propeller, stern-bush, and fastenings of the sea connections are to be examined while the vessel is in dry dock, and, if deemed necessary by the Surveyors, the stern shaft is to be drawn and examined at least once in four years, and more frequently if deemed necessary by the Surveyors.

36. The cylinders, pistons, slide valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

37. The sea connection and arrangements of cocks, pipes, bilge suctions, roses, &c., are to be examined.

38. The boilers and superheaters are to be examined, internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure ; the safe working pressure is to be determined by their actual condition.

39. The safety valves are to be examined and set to the safe working pressure.

40. If satisfactory, these surveys will be recorded in the Register Book thus :—"L.MC.5,80" *in red ;* or "B.&MS.5,80" *in red.*

41. "L.MC." (LLOYD'S MACHINERY CERTIFICATE) with a date, denotes that the machinery and boilers are fitted in accordance with the Rules, and were found upon examination at that time to be in good condition.

42. "B.&MS." (BOILERS and MACHINERY SURVEYED), with a date, denotes that the boilers and machinery, though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

43. In the event of either the machinery or boilers appearing to be impaired to such an extent as renders it desirable that either or both be specially surveyed within the periods prescribed above, a certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

**BOILERS.**

44. The boilers of all steam ships are to be specially surveyed when six years old, and subsequently they are to be specially surveyed annually.

45. At these surveys the boilers and superheaters are to be examined internally and externally, and if deemed necessary by the Surveyors, both boilers and superheaters are to be drilled or tested by hydraulic pressure ; tbe safe working pressure is to be determined by their actual condition.

46. The safety valves are to be examined and set to the safe working pressure.

47. If satisfactory, these surveys will be recorded in the Register Book thus : "B.S.5,80" *in red.*

48. "B.S." (BOILERS SURVEYED), with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

49. In the event of the boilers appearing to be impaired to such an extent as renders it desirable that they be specially surveyed within the periods prescribed above, a Certificate for a limited period will be granted according to the nature of the case.

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of Survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

## IRON SHEERSTRAKE.

**Section 25.** 1. The iron sheerstrake to be one inch in breadth for every six feet of the vessel's length for half her length in midships, and to be of the thickness given in Table H; it may then be gradually reduced in breadth and in thickness to three-fourths of the midship breadth and thickness at her ends.

2. The butts of the iron sheerstrake in all cases to be shifted clear of the butts of the stringer plates on the beam ends, the shift in no case to be less than equal to three spaces of frames, and all plates where practicable to be not less than nine feet long, but if the sheerstrake plates are eighteen feet long they may be of two equal breadths, but carvel plated and single riveted; butts of all plating to be fitted quite close, and in no case is the lower edge of the iron sheerstrake to be fitted less than two-thirds of the breadth required by the Rule for sheerstrake, below the upper deck stringer plate. The butt-straps in all cases to be in one piece, whether fitted outside or inside, and in no case to be in two pieces by being cut at the stringer plate. (*See* Section 30.)

## IRON BILGESTRAKE.

**Section 26.** The bilgestrake plates to be two-thirds the breadth of the iron sheerstrake, for three-fifths the length of the keel in midships, and from thence to the ends of the vessel they are to be reduced gradually to one-half their midship breadth; the thickness of the plates to be as prescribed in Table H, and they are to be fitted at the bilges with the middle of the plate at the height prescribed for floorheads, such position for the bilge plates to be maintained, notwithstanding that the floorheads may be carried higher. They are to be extended to the ends of the vessel in accordance with her form, and properly riveted to the frames.

## DIAGONAL PLATES ON FRAMES.

**Section 27.** The diagonal plates on the frames to be not less than one-third the breadth of the iron sheerstrake, and fitted in pairs, transversely, all fore and aft, at an angle of 45°, with the butts of each pair meeting between the frames; to be of the thickness given in Table H, and connected to the sheer and bilgestrake plates by butt-straps, double riveted, and to be efficiently riveted to each other, and to each frame they cross.

## STRINGER PLATES ON ENDS OF BEAMS.

**Section 28.** 1. All vessels to have stringer plates of the thickness given in Table H upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one, two, and three-decked vessels, to be in width one inch for every seven feet of the vessel's entire length, for half her length in midships and from thence to the ends of the vessel they may be gradually reduced to three-fourths the width in midships; in no case, however, is the width in midships to be less than eighteen inches. The stringer plates are to be riveted to the beams and properly shifted, fitted home, and riveted to the iron sheerstrake with an angle iron of the dimensions given in Table H, and the roughtree stanchions are not to pass through them. Stringer plates on the ends of beams below the upper deck may be reduced in width to three-fourths the midship breadth of the upper deck stringer, which breadth is to extend all fore and aft, and to have an angle iron of the dimensions given in Table H, extending all fore and aft, riveted to reverse angle iron on each frame and to the stringer plates.

2. In cases where a deck is not laid, and the width of the stringer plate on ends of hold beams is objected to, it may be reduced in width, provided such reduction be fully compensated for.

3. All stringer angle irons are to be in as long lengths as possible, properly shifted, and wherever butted to be connected with angle iron, or plate iron, not less than two feet long, fitted in the throat of them, properly riveted to each flange, and the thickness of the connecting plates not to be less than that of the angle iron they cover.

### GUTTER WATERWAYS.

4. Upper deck gutter waterways are to be flooded to ascertain if there be any leakage, and when completed they are to be properly cemented.

### TIE-PLATES.

**Section 29.** 1. All vessels are to have tie-plates ranging all fore and aft upon each side of the hatchways on each tier of beams, and in addition thereto the beams of the upper and middle decks in three-decked or spar-decked vessels, and of the upper deck in vessels of one or two decks, must have tie-plates fitted from side to side diagonally, in number, one pair for about every thirty-five feet of the vessel's length; these plates in both cases must not be less in width than once and a half the depth of the beams of their respective decks, and of the thickness required for stringer plates; they are to be well riveted to each other and to the beams and stringers, and to have intermediate fastenings into the deck plank between the beams. In all cases their butts to be chain riveted.

2. Upon hold beams where a deck is not to be laid, a tie formed of double angle iron, of the size given for the main frames of the ship, may be fitted each side of the hatchways in lieu of tie-plates; but, if the beams are made of such additional strength laterally as not to require the support given by the said angle irons or tie-plates, double angle irons of the above size fitted at the centre line from opening to opening may be substituted.

### HATCHWAYS AND MAST PARTNERS.

3. All hatchways and mast holes are to be properly framed to receive half beams where required, and the latter to have mast partners at each tier of beams (except at orlop beams), the plating of which is not to be less in thickness than is required for stringer plates, and the united breadths of the plates are not to be less than three times the diameter of the masts; these plates are to be well riveted to each other, and to the beams, and angle iron carlings; and at the decks, where the masts are to be wedged, an angle iron of the dimensions required for the main frame of the ship is to be properly fitted and riveted to the plate round the mast holes. The mast holes, skylights and companions must be properly secured to the satisfaction of the Surveyors. Where wood comings are fitted, plates are to be riveted to the beams to which the deck ends are to be fastened.

### SKYLIGHTS.

4. The skylights to engine-rooms, and the comings to which they are attached, are in all cases to be substantially constructed, and efficiently fastened to the beams, and, whether of iron or wood, are not to be less than two feet six inches above the upper deck in one or two-decked vessels, and one foot six inches above spar or awning decks. The skylights to be securely attached to the comings, and the glass in them should be very strong, from three-eighths to half an inch thick, protected by a strong guard of iron rods

or by a framework of wire; in addition, deadlights of either iron or wood should be fitted having bulls' eyes in them, and arrangements made for their efficient security in bad weather. Strong tarpauling covers are in all cases to be provided. In spar-decked vessels, and those having either a poop, awning deck or bridge house, with the engine room beneath, the hatchways in the upper deck are to be enclosed by iron trunk bulkheads, not less than five-sixteenths of an inch thick, strengthened by angle iron and extended from the upper deck to the beams above, to which they are to be secured. Strong iron doors will be allowed in these trunk bulkheads, provided their lower parts are at least eighteen inches above the upper deck, and arrangements made for their efficient security.

### COAL BUNKERS.

5. Coal bunker pipes, where practicable, are to be formed so as to be at least six inches above the upper deck, fitted with gratings and lids, the latter to have studs to fit in openings made in the pipes for their security, the pipes to be so formed that tarpauling may be securely lashed over them Where it is necessary to fit flat coal bunker scuttle lids flush with the deck, they must be secured by a bar, or other approved fastening.

### BUTT-STRAPS.

**Section 30.** Butt-straps in all cases, except those of floor-plates (*see* Section 13), to be one-sixteenth of an inch thicker than the plates they connect, and to be fitted with the fibre of the iron in the same direction as that of the plates, and riveted as per Section 4.

### BUTT-PLATES OF OUTSIDE PLANKING.

**Section 31.** The plates to which the butts of the outside planking are to be secured must be of the breadth of the planks, extending from frame to frame, efficiently riveted thereto, and of the thickness given in Table H; but on the bows and quarters, or wherever else the plank ends may have a tendency to strain off, they are to be one-eighth of an inch thicker than therein prescribed.

### PLANKING.

**Section 32.** 1. The material for planking to be in accordance with class in Table I, to be thoroughly seasoned, quite free from sap, wane, or other defects, to be wrought with the heart side to the frames, and with not less than three strakes between the butts, without step butting, and with not less than six-feet shifts; the garboard strakes to be shifted, and of the thickness given in Section 7; the bottom planking is not to be less in thickness than prescribed in Table H, from the garboard strakes up to within a fifth of the depth of hold set down below the upper deck stringer plate; from thence to the plank-sheer to be in thickness as prescribed in Table H for topsides; or, if preferred, the bottom planking may retain its thickness up to within a fourth of the depth of hold set down below the upper deck stringer plate, and from thence to the plankshеer be gradually diminished in thickness to that prescribed in Table H for topsides; the thickness of the wood sheerstrakes may be the thickness of the iron sheerstrake they cover less than that prescribed by Table H.

2. Outside planks (except the garboard strakes) are not to be more than twelve inches broad; they are to be fitted quite close to the frames and plates, and to each other at their inner edges, and wrought with proper seams outside in proportion to their thickness; the hood ends may be reduced one-fifth from the thickness given in Table H at the stem or sternpost, and one-third at the buttock. The caulking edge of the keel seam, and hood end seams of the planking at the stem and sternpost, need not exceed from

two and a half inches to four inches in proportion to the tonnage of the vessel; which can be arranged by trimming the back rabbet from the bearding line to the rabbet line, as required, so as not to unnecessarily reduce the keel, stem, and sternpost. Furrens or pads are in no case to be used.

## BOLTS.

**Section 33.** 1. The bolts to be not less than the sizes given in Table K; the garboard strakes to be cross-bolted from side to side, with bolts not exceeding four feet six inches apart.

2. The wood keel to have a vertical bolt through the keel plate between each frame. The stem, sternpost, deadwood, and remainder of the keel, to be through fastened in all cases, and the bolts spaced as in the keel.

3. The screw-pointed bolts for fastening the planking, when less than five inches thick, to be of such form under the heads as will prevent them from turning; their heads to be once and three-quarters the diameter of the bolts, and two-fifths their diameter in thickness; the nuts in all cases to be of the same description of metal as the bolts they are applied to, and to be in thickness equal to their diameter, and not to have less substance than three-eighths of the diameter of the bolts in any part, whatever the form may be, hexagon form being preferred.

4. All outside planks ten inches broad and above, to be double fastened; eight inches and a half and under ten inches, double and single fastened alternately; and under eight and a half inches single fastened; and all butts to be double fastened.

5. The bolt holes in the outside planking to be enlarged with a dowelling machine for the bolt heads, which in the bottom up to within one-fifth the depth of hold set down below the upper deck stringer plate, are to be sunk within the surface of the planking one inch and a quarter, when dowels are intended to be used; from thence to the plankshear they need not be sunk more than three-quarters of an inch; the bolts to be properly driven with oakum and white lead, putty, marine glue, or other suitable composition under their heads, and in the bottom they are to be carefully covered (after the seams in the bottom are all caulked) with turned well-seasoned wood dowels, the fibre of which must be in the same direction as the plaking, and be driven with white lead, marine glue, or any other approved composition. Where copper or yellow metal bolts are used, the sinking of them within the surface of the planking to be optional to the above extent.

## PLANKING OF TWO THICKNESSES.

**Section 34.** 1. If the vessel is to be planked with two thicknesses, the whole of the inside thickness must be of material required by Table I for the upper part of the vessel, and the outside thickness, if worked longitudinally, must be of the same material as is prescribed for a vessel constructed with a single thickness of planking, but if the outside thickness is to be worked diagonally, American Rock Elm may be used. If either or both thicknesses be worked longitudinally, or diagonally, each thickness need only be one-half that prescribed in Table H, but thick garboard strakes will be required to be fitted and fastened as in the case of vessels with a single thickness of planking. When the outside thickness is worked diagonally, a longitudinal strake of plank must be rabbeted into the garboard strake, and the ends of the diagonal planks butted against it; there must also be one or more longitudinal strakes of plank of the materials prescribed in Table I for the upper part of the vessel, fitted above the upper ends of the diagonal planking; and, if the topsides be of a single thickness, the upper edge of the said longitudinal planking

must be partly let into the topside plank or be rabbeted into a solid strake, so that it may be efficiently caulked. In all such cases both thicknesses must be caulked, and the outer thickness wrought hot on the *best hair felt*.

2. If both thicknesses of plank be worked diagonally, tranversely to each other, from keel to gunwale, the bilge and diagonal plates may be dispensed with; but, where the thicknesses are otherwise arranged, the bilge and diagonal plates must be fitted as in vessels with single thickness; the diagonal plates may, however, be extended to ten feet apart on a square with three pairs crossing each other in thecentre.

3. When the inner thickness of plank is wrought diagonally, all the planks must be double fastened to the frames, but, when wrought longitudinally, they may be fastened as per Section 33, the bolts in either case must be of the size prescribed in Table K. The outer thickness of plank must be secured to the inner by nut and screw bolts, or else by wrought copper bolts, driven through the inner thickness and clenched inside upon copper or yellow metal rings; a reduction of one-fifth of the diameter from that prescribed in Table K will be allowed when nut and screw bolts are used for fastening the outer thickness of plank, and a reduction of one-third when it is intended to use wrought copper and to clench the bolts of this thickness.

4. In vessels claiming the additional period for copper or yellow metal bolts, the fastenings in both thicknesses must be of the description and to the height required in those having only one thickness. Where two thicknesses of planking are adopted, dowelling will not be allowed in either thickness.

5. When the planking is composed of two thicknesses, the outside thickness of planking should not exceed ten inches in breadth, and may be single fastened, but the fastenings are not to exceed twenty inches apart on an edge; if, however, planks are used in the lower part of the bottom more than ten inches but not exceeding twelve inches in breadth, their fastenings are not to exceed eighteen inches apart on an edge.

6. All iron work, and all iron and wood surfaces which come in contact with each other, are to be properly coated with good paint, or other suitable composition.

## CAULKING.

**Section 35.** 1. It is indispensable that the caulking should be well executed, and no material used but the best brown oakum, with tarred spun yarn for the inner thread of bottom. The Surveyors are required to see the caulking thoroughly tested with a beetle and horse, especially in new vessels, and at all surveys when the sheathing is stripped off the bottom.

2. In vessels with two thicknesses of planking, the condition of the caulking of the outside thickness is to be ascertained, in new vessels, by having a few pieces cut out from the bottom planking so as to expose the oakum; but it will not be necessary to have pieces cut out in vessels with single bottoms, as it can be ascertained whether the oakum is properly driven into the seams by inserting a thin knife into them from within the vessel.

## KNIGHTHEADS, HAWSE TIMBERS, UPPER-DECK WATERWAYS, AND PLANKSHEER.

**Section 36.** 1. Where the knightheads, hawse timbers, upper-deck waterways, and plank-sheer are of wood, they must be of materials according to class in Table I, and fastened with bolts as in Table K.

2. The knightheads and hawse timbers are to be of sufficient siding and moulding, and to have boxing either outside or inside above the upper deck; they are to extend high enough for the efficient security of the bowsprit, and sufficiently below the upper deck to insure strength; to be well bolted, and connected by substantial hooks.

### WATERWAYS.

3. Where the roughtree stanchions are of wood, the depth and moulding of the upper deck waterway must be sufficient to give them support; but the depth of the waterway is in no case to be less than three times the thickness of the upper deck, excepting where the plankshеer covers it, and it will be required to be well bolted through the sheerstrakes or spirketting plate and upper deck stringer plate.

### DECKS.

**Section 37.** 1. The flat of all decks to be of good quality, properly seasoned, free from sap and objectionable knots, the thickness and fastenings as per Table H.

### DECK BOLTS.

2. The upper deck plank to be fastened by screw bolts from the upper side with nuts at the under side of the angle iron of the beams, and to the tie-plates (*see* Section 29). The bolts must be properly sunk with oakum and white lead under their heads, and be carefully covered over with turned dowels, with the fibre in the same direction as the deck plank, bedded in white lead, marine glue, or other suitable composition.

3. When the deck planks are six inches in width and under, single fastening will be sufficient; but, when they are above six inches and not exceeding eight inches in width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding eight inches in width must be double fastened with nut and screw bolts.

4. If the deck is of teak, it may be one-eighth less in thickness than prescribed in Table H.

5. Upper decks must be renewed when worn in thickness as follows:—When a deck originally 4 inches thick is worn to 3 inches; $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches; 3 inches to $2\frac{1}{2}$ inches.

### CEILING.

**Section 38.** All vessels to be closely ceiled from the main keelson to the upper part of the bilges, the ceiling to be secured in such a manner as to be easily removed, and from the upper part of the bilges upwards, either close ceiling or batten and space may be adopted, but the letter is considered preferable. It is recommended that the ceiling on the floors should be made in hatches, where practicable, of convenient sizes so as to be lifted when required for the purpose of survey, or for cleaning and painting. The thickness of the ceiling in the hold from the main keelson to the upper part of the bilges to be in accordance with Table H, and one-third less in thickness from thence upwards.

### RUDDER.

**Section 39.** 1. The main piece of rudder to be of timber, according to class in Table I, of dimensions as per Table H, and the pintles as per Table K. In screw steamers, the size of the main piece of rudder must be increased in diameter not less than one-eighth above the dimensions given in Table H, and the pintles and braces in the same proportion.

## RUDDER BRACES.

2. The lower rudder brace is to extend on the bottom planking sufficiently to receive not less than three bolts before the hood ends in addition to the bolts in the sternposts; the remaining braces will not be required to pass the hood ends, but the ends of their arms should be made ⊣ shaped, or of other suitable form, so as to receive three through bolts in the sternpost.

## CHAIN PLATE AND PREVENTER BOLTS.

**Section 40.** The chain plate and preventer bolts to be of the sizes given in Table K. When the chain and preventer plates are fitted on wood topsides, and the chain and preventer bolts are arranged to pass through below the iron sheerstrake, a plate is to be riveted to the frames, before working the wood topsides, of the same thickness as the sheerstrake, sufficiently wide to take the said bolts, and fillings of wood may be introduced between the frames for the bolts to pass through and be clenched upon plates, or otherwise secured to the satisfaction of the Surveyors.

## CEMENT.

**Section 41.** All vessels to be efficiently cemented in the bottom, to the upper part of the bilges care to be taken to have proper water courses above the cement all fore and aft.

**Section 42.** 1. The Surveyors in their reports of vessels for original classification, which have partial deficiencies in either the workmanship, materials, or construction, are to state the same for the consideration of the Committee, when such vessels will be liable to have a reduced number of years assigned to them than they would otherwise have been entitled to.

2. *The Surveyors in submitting their reports of vessels not already classed, are in all cases, where practicable, to forward a sketch of the midship section, and other drawings where necessary, to be furnished by the builders, with figured dimensions of the component parts marked thereon.*

3. *Builders wishing to adopt plans other than those described herein, are to submit them in the usual manner through the Resident Surveyors (who are to state their opinions thereon) for the Committee's consideration and approval.*

## PERIODICAL SURVEYS DURING CLASSIFICATION.

### * PERIODICAL SURVEYS. (*See* N.B. at foot.)

**Section 43.** 1. All vessels to be surveyed annually if practicable; and whenever the copper, yellow metal, wood, or other sheathing, is stripped off, the condition of the planking, fastenings, and caulking to be ascertained.

2. Vessels marked C.F. to be subject to a Special Survey every *four* years; and those marked G.I.B. and I.B., to be subject to a Special Survey every *three* years. Such Special Surveys will be noted in the Register Book.

3. When these Special Surveys are held, the vessel to be placed on blocks of a proper height in a dry dock, or upon ways; if she is sheathed with wood, a sufficient quantity must be removed for the examination of the bolts, caulking and planking.

* In the cases of Steam Vessels, *see* Section 24, for Survey of Engines and Boilers.

*N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of Survey, it is hereby intimated that the duty of giving* NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

4. At the first Special Survey the limber boards, and ceiling equal to one strake fore and aft on both sides in the hold, below the upper turn of bilge, must be removed.

5. At subsequent Special Surveys, ceiling equal to an additional strake on both sides in the hold, and one strake on both sides in the 'tween decks (provided it is close ceiled), must be removed; portions of the cement to be cut out to ascertain its condition, and that of the frames and keel plate; bolts of the bottom and keel, if of iron to be got out for examination,—the number removed, and their condition, to be stated in the Report of Survey. If the frames, floors, &c., are found to be much oxidized, the whole of the ceiling to be removed and the oxidation cut or beaten off, and the iron work, if necessary, renewed, and the whole then to be properly coated or painted.

6. At the second Special Survey the windlass to be unhung where necessary, and its wood lining sufficiently stripped for examination, and the chain cables ranged for inspection.

### VESSELS NOT SURVEYED WHILE BUILDING.

**Section 44.** 1. Vessels built in Great Britain, or the British North American Colonies, which have not been surveyed while building, will lose one year of the period to which they might otherwise have been entitled.

2. When a character is claimed for such a vessel, she must be placed on high blocks in a dry dock, or on a slip, or other convenient place, so that the keel and bottom may be seen and properly examined. The hold must be cleared, and proper stages made, the outside planking scraped bright from the light water-mark to the waterway seam, a sufficient number of fastenings removed from the keel, the planking of the flat of bottom, the bilges, between the light and load-line, and from the topsides, in order that their condition may be thoroughly ascertained.

3. Should the vessel be less than four years old from the date of launching, if close ceiled, a quantity of ceiling equal to one strake fore and aft on each side in the 'tween decks, a like quantity at the upper turn of bilge, and one plank at the lower turn of the bilge on each side over the floors in midships, will be required to be removed, and the limber boards lifted; but should the vessel exceed four years of age, unless she be found in a very clean and satisfactory condition, the whole of the ceiling, or such portion as the Surveyors may require, must be removed, excepting in the case of "batten and space ceiling."

### WOODEN FLOORS, &c.

4. Should the vessel, however, have been constructed with wooden floors, or with iron and wooden frames, and with through fastenings, passing through the ceiling, and she be under four years of age, it will be sufficient if, in lieu of removing the ceiling as above described, a listing be cut out fore and aft on both sides in the 'tween decks 4 inches wide, a ceiling plank at the upper turn of the bilge and at the lower turn of bilge on each side over the floors to be taken out, and the limber boards lifted; but if she exceed four years of age, in addition to the above, a 4-inch listing must be extended fore and aft at the turn of the bilge on each side; and at other parts if considered necessary by the Surveyors.

5. When the foregoing preparations have been made, a careful survey must be held by two Surveyors (one of them to be an exclusive officer of the Society), who shall submit a report and midship section containing a full description of the vessel, comparing the same with the Rules.

6. Should a vessel submitted for classification be sheathed with wood or metal, the same will not be required to be stripped off (if all be found satisfactory to the Surveyors) beyond a sufficient quantity at

the keel, hood ends, bilges, and between the light and load water-lines, for the purpose of ascertaining the condition of the caulking and the fastenings.

## CONTINUATION OF SHIPS ON THE A CHARACTER.*

**Section 45.** 1. If, on the expiration of the term of years originally assigned, or at any age of a vessel, the owner be desirous to have his ship remain or be replaced on the letter A, such continuation will be granted for a period not exceeding two-thirds the number of years assigned originally, provided that a Special Survey as hereafter described be held by two Surveyors, one of them to be an exclusive officer of the Society, and that all repairs found necessary be completed to their satisfaction. The number of years assigned on continuation to commence from the date of the completion of such repairs.

2. The ship must be placed in dry dock or laid on blocks upon ways, so that the keel and bottom may be examined.

3. All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.

4. The hold to be cleared, and proper stages made both inside and outside.

5. All the outside planking from the light water-mark upwards, including plankshеers and waterways, to be scraped or dubbed bright.

6. All the close ceiling, where the frames and floors are of iron, to be removed from the upper part of the bilges downwards, and, where close ceiling is fitted above this height, two strakes of ceiling are in addition to be removed between decks, and two strakes in the hold all fore and aft, when, should the condition of the frames and planking render it, in the opinion of the Surveyors, necessary, the whole of the close ceiling is to be removed.

7. The planking of one strake extending from amidships forward on one side, and from amidships aft on the other side, to be removed to expose the bilge plate, diagonal plates, and the backs of the frames, and when the iron sheerstrake is covered with planking an additional plank is to be removed in way of the same.

8. Not less than twelve bolts on each side, whether of iron or yellow metal, to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship; also cement to be removed in places, for the purpose of ascertaining the condition of the floors, frames, iron keel-plate, butt straps to outside planking, &c.

9. Where the middle line bolts are of iron, their condition is to ascertained; but, if this be not practicable, additional intermediate bolts of copper or yellow metal must be driven through and clenched.

10. The windlass to be unhung, and its wood lining sufficiently stripped for examination.

11. The cables to be ranged, and the anchors and general equipment examined. The coal bunkers in steamers to be cleared, and all iron-work to be scraped clean.

12. *The annual and special periodical surveys to apply to vessels so continued as required by Section* 43 *for ships on original class.*

* Where composite vessels are not constructed in accordance with the Committee's printed suggestions, and a deviation is required from a strict compliance with the Rules, special application must be made to the Committee.

By Order of the Committee,

BERNARD WAYMOUTH,

*Secretary.*

*No.* 2, *White Lion Court, Cornhill, London, E.C.*

1*st July*, 1885.

## COMPOSITE SHIPS.—TABLE OF MINIMUM DIMENSIONS OF FRAMES, PLANKING, KEELS, KEELSONS, STEMS, STERN POSTS, FLOOR PLATES, BEAMS, STRINGERS, &c.

# TABLE H.

All plates, and all beam and angle iron, used in ships intended for classification, are to be stamped legibly in two places with the manufacturer's trade mark, or his name and the place where made.

| Tonnage. *See Notes to Table.* | Distance of Frames from Moulding Edge to Moulding Edge all Fore and Aft. | Siding of Keel, Stem, and Stern Post, and Moulding of Stem. | Moulding of Stern Post and Keel. | Breadth and Thickness of Keel Plate, Flat Plate Keelson, and Thickness of Single Plate Vertical Keelson, standing upon Floors. | | Dimensions of Angle Iron for Frames, and the Lower Angle Irons of Box Keelsons. | Dimensions of Angle Iron for Reversed Frames, and the Top Angle Irons of Box Keelsons. | Thickness of Centre Plate Keelson, Sheerstrake, (where not planked over) also of Butt Plates for Planking in Midships. | Thickness of Floor Plates, Hooks, Crutches, Side Intercostal, and Box Keelson. | Thickness of Stringer Plates upon Beam Ends, Tie Plates on Beams, Sheer strake (where planked over) and Topside Plating (where not planked over) Bilge Strake and Diagonal Plates on Frames, and Middle Line Intercostal Keelsons. | Dimensions of Angle Iron on Beam Stringers, Stringers in Hold, and Keelsons. | Diameter of Solid Pillars to Beams. | | Thickness of Outside Plank. | | Thickness of Upper Deck, and Planksheer. *See Notes to Table.* | Thickness of Wood Ceiling in Hold to upper part of Bilges. | Windlass. *See Notes to Table.* | | Main Piece of Rudder, from Lower Part of Counter upwards, Pall Bitt, and Wood Keelson, Sided and Moulded. | Tonnage. *See Notes to Table.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Breadth. | Thickness. | | | | | | | Hold. | Deck. | From the Garboard Strake up to within one-fifth of the Depth of Hold set down below the Upper Deck Stringer. | Topsides from the Planksheer to within one-fifth of the Depth of Hold set down below the Upper Deck Stringer. | | | Diameter of Iron Spindle. | Diameter of Main Piece. | | |
| Tons. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | inches. | Tons. |
| 50 and under 100 | 18 | $9\frac{1}{2}$ | 11 | 19 | $\frac{8}{16}$ | $2\frac{3}{4}\times2\frac{3}{4}\times\frac{5}{16}$ | $2\frac{1}{4}\times2\frac{1}{4}\times\frac{4}{16}$ | $\frac{6}{16}$ | $\frac{5}{16}$ | $\frac{5}{16}$ | $3\times3\times\frac{5}{16}$ | — | 2 | 4 | $2\frac{1}{2}$ | $2\frac{3}{4}$ | $1\frac{1}{2}$ | $2\frac{1}{4}$ | $12\frac{1}{2}$ | $9\frac{1}{2}$ | 50 and under 100 |
| 100 and under 200 | 18 | $10\frac{1}{2}$ | 12 | 21 | $\frac{9}{16}$ | $2\frac{3}{4}\times2\frac{3}{4}\times\frac{6}{16}$ | $2\frac{1}{4}\times2\frac{1}{4}\times\frac{5}{16}$ | $\frac{7}{16}$ | $\frac{5}{16}$ | $\frac{6}{16}$ | $3\times3\times\frac{6}{16}$ | $2\frac{1}{2}$ | $2\frac{1}{4}$ | 4 | 3 | 3 | $1\frac{1}{2}$ | $2\frac{1}{2}$ | 14 | 11 | 100 and under 200 |
| 200 and under 300 | 18 | $11\frac{1}{2}$ | 13 | 23 | $\frac{10}{16}$ | $3\times3\times\frac{6}{16}$ | $2\frac{1}{4}\times2\frac{1}{4}\times\frac{5}{16}$ | $\frac{8}{16}$ | $\frac{6}{16}$ | $\frac{7}{16}$ | $3\times3\times\frac{6}{16}$ | $2\frac{3}{4}$ | $2\frac{3}{8}$ | $4\frac{1}{2}$ | $3\frac{1}{2}$ | $3\frac{1}{4}$ | $1\frac{3}{4}$ | $2\frac{3}{4}$ | 15 | 12 | 200 and under 300 |
| 300 and under 400 | 18 | $12\frac{1}{2}$ | 14 | 25 | $\frac{10}{16}$ | $3\times3\times\frac{6}{16}$ | $2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$ | $\frac{9}{16}$ | $\frac{7}{16}$ | $\frac{8}{16}$ | $3\times3\frac{1}{2}\times\frac{6}{16}$ | $2\frac{7}{8}$ | $2\frac{3}{8}$ | $4\frac{1}{2}$ | $3\frac{1}{2}$ | $3\frac{1}{2}$ | 2 | 3 | 16 | 13 | 300 and under 400 |
| 400 and under 500 | 18 | 13 | $14\frac{1}{2}$ | 26 | $\frac{11}{16}$ | $3\frac{1}{4}\times3\frac{1}{2}\times\frac{7}{16}$ | $2\frac{1}{2}\times2\frac{3}{4}\times\frac{6}{16}$ | $\frac{9}{16}$ | $\frac{7}{16}$ | $\frac{8}{16}$ | $3\times4\times\frac{6}{16}$ | 3 | $2\frac{1}{2}$ | 5 | 4 | $3\frac{1}{2}$ | $2\frac{1}{4}$ | $3\frac{1}{4}$ | 17 | 14 | 400 and under 500 |
| 500 and under 600 | 18 | $13\frac{1}{2}$ | 15 | 27 | $\frac{11}{16}$ | $3\frac{1}{4}\times3\frac{1}{2}\times\frac{7}{16}$ | $2\frac{1}{2}\times3\times\frac{6}{16}$ | $\frac{10}{16}$ | $\frac{8}{16}$ | $\frac{9}{16}$ | $3\frac{1}{2}\times4\times\frac{7}{16}$ | $3\frac{1}{8}$ | $2\frac{1}{2}$ | 5 | 4 | $3\frac{3}{4}$ | $2\frac{1}{2}$ | $3\frac{1}{2}$ | 18 | $14\frac{3}{4}$ | 500 and under 600 |
| 600 and under 700 | 18 | 14 | $15\frac{1}{2}$ | 28 | $\frac{12}{16}$ | $3\frac{1}{2}\times4\times\frac{8}{16}$ | $2\frac{3}{4}\times3\times\frac{6}{16}$ | $\frac{10}{16}$ | $\frac{8}{16}$ | $\frac{9}{16}$ | $3\frac{1}{2}\times4\frac{1}{2}\times\frac{7}{16}$ | $3\frac{1}{4}$ | $2\frac{1}{2}$ | $5\frac{1}{2}$ | $4\frac{1}{2}$ | $3\frac{3}{4}$ | $2\frac{1}{2}$ | $3\frac{5}{8}$ | 19 | $15\frac{1}{2}$ | 600 and under 700 |
| 700 and under 800 | 18 | $14\frac{1}{2}$ | 16 | 29 | $\frac{12}{16}$ | $3\frac{1}{2}\times4\times\frac{8}{16}$ | $3\times3\times\frac{6}{16}$ | $\frac{11}{16}$ | $\frac{9}{16}$ | $\frac{10}{16}$ | $4\times4\frac{1}{2}\times\frac{8}{16}$ | $3\frac{3}{8}$ | $2\frac{1}{2}$ | $5\frac{1}{2}$ | $4\frac{1}{2}$ | 4 | $2\frac{3}{4}$ | $3\frac{3}{4}$ | 20 | 16 | 700 and under 800 |
| 800 and under 900 | 18 | 15 | $16\frac{1}{2}$ | 30 | $\frac{13}{16}$ | $3\frac{3}{4}\times4\frac{1}{2}\times\frac{9}{16}$ | $3\times3\times\frac{7}{16}$ | $\frac{11}{16}$ | $\frac{9}{16}$ | $\frac{10}{16}$ | $4\times5\times\frac{8}{16}$ | $3\frac{1}{2}$ | $2\frac{1}{2}$ | 6 | $4\frac{3}{4}$ | 4 | $2\frac{3}{4}$ | 4 | 21 | $16\frac{1}{4}$ | 800 and under 900 |
| 900 and under 1000 | 18 | $15\frac{1}{2}$ | 17 | 31 | $\frac{13}{16}$ | $3\frac{3}{4}\times4\frac{1}{2}\times\frac{9}{16}$ | $3\times3\frac{1}{4}\times\frac{7}{16}$ | $\frac{12}{16}$ | $\frac{10}{16}$ | $\frac{11}{16}$ | $4\times5\times\frac{9}{16}$ | $3\frac{1}{2}$ | $2\frac{5}{8}$ | 6 | $4\frac{3}{4}$ | 4 | $2\frac{3}{4}$ | $4\frac{1}{4}$ | 22 | $16\frac{1}{2}$ | 900 and under 1000 |
| 1000 and under 1200 | 18 | 16 | $17\frac{1}{2}$ | 32 | $\frac{14}{16}$ | $3\frac{3}{4}\times4\frac{3}{4}\times\frac{9}{16}$ | $3\times3\frac{1}{2}\times\frac{8}{16}$ | $\frac{12}{16}$ | $\frac{10}{16}$ | $\frac{11}{16}$ | $4\frac{1}{2}\times5\times\frac{9}{16}$ | $3\frac{1}{2}$ | $2\frac{5}{8}$ | $6\frac{1}{4}$ | 5 | 4 | 3 | $4\frac{1}{2}$ | 23 | $16\frac{3}{4}$ | 1000 and under 1200 |
| 1200 and under 1500 | 18 | $16\frac{1}{2}$ | 18 | 33 | $\frac{14}{16}$ | $3\frac{3}{4}\times4\frac{3}{4}\times\frac{9}{16}$ | $3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$ | $\frac{13}{16}$ | $\frac{11}{16}$ | $\frac{12}{16}$ | $4\frac{1}{2}\times5\frac{1}{2}\times\frac{9}{16}$ | $3\frac{5}{8}$ | $2\frac{5}{8}$ | $6\frac{1}{4}$ | 5 | 4 | 3 | $4\frac{5}{8}$ | 24 | 17 | 1200 and under 1500 |
| 1500 and under 2000 | 18 | 17 | $18\frac{1}{2}$ | 34 | $\frac{15}{16}$ | $4\times5\times\frac{10}{16}$ | $3\frac{1}{2}\times4\times\frac{9}{16}$ | $\frac{13}{16}$ | $\frac{11}{16}$ | $\frac{12}{16}$ | $5\times6\times\frac{9}{16}$ | $3\frac{3}{4}$ | $2\frac{3}{4}$ | $6\frac{1}{2}$ | $5\frac{1}{4}$ | 4 | 3 | $4\frac{5}{8}$ | $25\frac{1}{2}$ | $17\frac{1}{2}$ | 1500 and under 2000 |
| 2000 and under 2500 | 18 | $17\frac{1}{4}$ | 19 | $34\frac{1}{2}$ | $\frac{15}{16}$ | $4\times5\frac{1}{2}\times\frac{10}{16}$ | $3\frac{1}{2}\times4\frac{1}{2}\times\frac{10}{16}$ | $\frac{14}{16}$ | $\frac{12}{16}$ | $\frac{13}{16}$ | $5\frac{1}{2}\times6\frac{1}{2}\times\frac{10}{16}$ | $3\frac{3}{4}$ | $2\frac{3}{4}$ | 7 | $5\frac{3}{4}$ | 4 | 3 | $4\frac{3}{4}$ | 27 | 18 | 2000 and under 2500 |
| 2500 and under 3000 | 18 | $17\frac{1}{4}$ | $19\frac{1}{4}$ | $34\frac{1}{2}$ | $\frac{15}{16}$ | $4\times6\times\frac{11}{16}$ | $3\frac{1}{2}\times4\frac{1}{2}\times\frac{10}{16}$ | $\frac{14}{16}$ | $\frac{12}{16}$ | $\frac{13}{16}$ | $5\frac{1}{2}\times6\frac{1}{2}\times\frac{10}{16}$ | $3\frac{3}{4}$ | $2\frac{3}{4}$ | $7\frac{1}{2}$ | 6 | 4 | 3 | $4\frac{3}{4}$ | $28\frac{1}{2}$ | 19 | 2500 and under 3000 |
| 3000 and under 3500 | 18 | $17\frac{1}{2}$ | $19\frac{1}{2}$ | 35 | $\frac{16}{16}$ | $4\times6\frac{1}{2}\times\frac{11}{16}$ | $3\frac{1}{2}\times4\frac{1}{2}\times\frac{10}{16}$ | $\frac{15}{16}$ | $\frac{12}{16}$ | $\frac{13}{16}$ | $5\frac{1}{2}\times6\frac{1}{2}\times\frac{10}{16}$ | $3\frac{3}{4}$ | $2\frac{3}{4}$ | 8 | 6 | 4 | 3 | 5 | 30 | 20 | 3000 and under 3500 |

MEM.—The scantlings given in the above Table are intended for Ships the length of which, measured from the fore part of the Stem to the after part of the Stern-post on the range of the Upper Deck, does not exceed seven times their moulded breadth or ten times their depth of Hold, taken from the upper part of Floors to the top of the Upper Deck Beams. *For Ships which exceed these proportions, the plans to be submitted for the Committee's consideration.* The depth for defining the proportions of spar decked vessels, is to be measured from the top of the floor plates to the upper side of the middle or tonnage deck beams.

| RIVETS. Diameter of Rivets required for Thickness of Plates - - - | $\frac{5}{8}$ of an Inch. | | $\frac{3}{4}$ of an Inch. | | | $\frac{7}{8}$ of an Inch. | | | | 1 Inch. | | | Diameter of Nut and Screw Bolts for Fastening Flat of Deck. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\frac{5}{16}$ | $\frac{6}{16}$ | $\frac{7}{16}$ | $\frac{8}{16}$ | $\frac{9}{16}$ | $\frac{10}{16}$ | $\frac{11}{16}$ | $\frac{12}{16}$ | $\frac{13}{16}$ | $\frac{14}{16}$ | $\frac{15}{16}$ | $\frac{16}{16}$ | 3 ins. and under $3\frac{1}{2}$ ins. - - $\frac{1}{2}$ inch<br>$3\frac{1}{2}$ ,, ,, 4 ,, - - $\frac{9}{16}$ ,,<br>4 inches - - - - - - - $\frac{5}{8}$ ,, |

*Lloyd's Register of Shipping, London, 15th May, 1879.*

# NOTES TO TABLE H.

TONNAGE.—In flush-decked vessels having either one, two, or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull, and also the equipment of the vessel. In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, or awning deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power*, is to regulate the equipment, and also the size of the main piece of rudder and windlass, and the keel and keelsons and their number, and the scantling of the stringer plates on the upper and lower deck beams, and the requirements as to double rivetting. But in vessels where the tonnage of the erections above the tonnage deck is less than that required for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment and the size of the main piece of rudder and windlass, and the keel and keelsons and their number, the scantling of the stringer plates on the upper and lower deck beams, and the requirements for double rivetting.

WOOD KEEL, Stem, and Stern Post to be of the dimensions specified in Table.

KEEL PLATE.—The keel plate to be of the breadth and thickness prescribed in Table H, to be made continuous up the apron and up the inner stern-post as high as practicable, but in all cases to extend above the lower deck or hold beam stringer angle iron. Forward and aft the plate is to be curved to the form of the bearding line, and to be one-sixteenth of an inch thicker than prescribed in the Table, where it passes over the deadwoods, apron, and inner stern-post, and to be sided as required by the form of the vessel, to have an angle iron of the size given in Table for stringer angle irons rivetted on each edge, flanged to the form of the vessel to receive the plank fastenings. The keel plate to maintain its breadth for three-fifths the length of the keel in midships, and then to be gradually reduced until its edges conform with the flange of the angle iron on the keel plate forward and aft; the butts of the keel plates to be shifted clear of the keel scarphs.

FRAMES.—The frames to be of the dimensions as set forth in Table, and the narrow flange to be of a parallel thickness, that the nuts of the screw bolts may fit closely. The frames to be in as long lengths as possible, fitted and rivetted on to the keel plate, and extended as near to the middle line as practicable, according to the plan of construction adopted, and in all cases to extend to the gunwale, and where raised quarter decks, poops, forecastles and spar decks are constructed, to their deck stringers respectively, except when constructed with a rounded form at the gunwale, then they may terminate at the lower part of the curve; if the frames be welded, the welds to be perfect with not less than four feet shifts from the welds of next frames, or if butted to have not less than four feet shifts with four feet lengths of angle iron of the same size as the frame, fitted back to back rivetted to them, and secured to the outside planking. The spacing of the frames (where one thickness of planking in the bottom is intended) not to exceed 18 inches from moulding edge to moulding edge all fore and aft, a four feet length of angle iron, the size of the frame, is to be rivetted to each floor and to the keel plate, back to back with the frames.

FLOOR PLATES.—The floor plates to be in thickness according to Table, but at each end of the vessel for one quarter of her length they may be reduced in thickness one-sixteenth of an inch where the midship floor plates are six-sixteenths and under ten-sixteenths of an inch, and two-sixteenths of an inch where the plates are ten-sixteenths and above in thickness. The floor plates to be in depth at middle line according to the following rule, viz., to the vessel's depth, measured from the top of the keel to the top of the upper or spar-decked beams amidships add the extreme breadth of the vessel, two-fifths of that sum in inches to be the depth of the floor plates at the middle line well fore and aft, but at the extreme fore and after ends, they must be deeper, so as to form an efficient connection between the two sides of the vessel. The floor plates are to extend up the bilges not less than to a perpendicular height of *twice* and a *half* the depth of floors amidships, from upper side of keel at middle line; and in no case to be less moulded in any part, than a fair taper between the depth at middle line, and the moulding at their extreme ends, which is to be not less than the moulding of the frames. The ends of the floors to maintain the height prescribed amidships, for one quarter of the vessel's length, they may then be gradually lowered forward and aft until the upper edges of the floor plates are level, which place is to be determined by the form of the vessel, and from that point to the vessel's ends they are to be gradually increased in depth, so as to efficiently connect the sides of the vessel; the upper parts of the floors forward and aft are to be high enough to give ample room between the reverse frames on each side of the vessel, for fitting the keelson angle irons. In vessels having considerable rise of floor, the depth of the floor plates, on a square, at the quarter of the vessel's extreme moulded breadth, set out from the middle line, is to be not less than three-fifths the depth of the floor plate, at the middle line, and the floor plate is to be extended up the bilges, by a fair taper from middle line, until it terminates at the moulding of the frames. A floor plate to be fitted and rivetted to every frame, and to be extended across the middle line; but where a vertical centre plate is adopted at middle line, then the floor plates are to be efficiently connected to it on each side by double vertical angle irons of not less size than the reversed frames. When floors extend from side to side and are made in two lengths, the butts are to have double butt straps, one on each side of the floor plates, and three-fourths the thickness of the floor plates, or else the floor plates must be lapped and treble rivetted.

WATERCOURSES.—Watercourses are to be formed through all the floor plates, on each side of the middle line and at the bilges above the frames, so as to allow water to reach the pumps freely, and also through the vertical centre plate, and intercostal keelsons when such keelsons are adopted.

REVERSED FRAMES.—Reversed angle irons on frames to be in size as per Table. All vessels under 200 tons to have reversed angle-iron rivetted to every frame and floor plate, across the middle line, extended to the height of the upper part of the bilge, and to the gunwale on alternate frames, and to have double reversed angle irons in way of all keelsons and stringers in hold; and in addition, all vessels of 200 tons and upwards, to have reversed angle-iron extended to the upper deck beam stringer on alternate frames, and where raised quarter decks and spar-decks are constructed, to their deck stringers respectively, except when constructed of a rounded form at the gunwale, then they may terminate at the lower part of the curve; and on the remaining frames reversed angle-irons are to be fitted to above the height of the lower deck or hold beam stringer angle-iron, if the vessel has two decks or tiers of beams, and to above the height of the middle deck beam stringer angle-iron, if the vessel has three decks or tiers of beams, the rivets for securing the reversed angle-iron to the frames and floor plates to be in diameter as specified in Table, and be spaced not to exceed a distance of nine times their own diameter from centre to centre; butts of reversed angle-iron to be secured with butt straps.

BEAMS.—Beams to be of bulb plate, with double angle-irons on the top edge, or of T bulb iron, or of any other approved form of equal strength. The upper deck beams to be one quarter of an inch in depth to every foot in length of the midship beam, and to be in thickness one-sixteenth of an inch for every inch in depth, with one-sixteenth of an inch added; if of T bulb the united breadth of the top flanges to be not less than three-fourths the depth of the beam, and where beams are formed of bulb plate with double angle-irons on the top edge, the flanges of each of the angle-irons are not to be less in their united breadth than three-fourths the depth of the beam, and to be one-sixteenth of an inch in thickness for every inch of the two sides of the angle-iron. Middle deck, hold, and orlop beams, to be one-eighth of the depth deeper, and one-sixteenth of an inch thicker than the upper deck beams. All beams to be efficiently connected with the frames by bracket ends, or knee plates, the arms of each to be not less than twice-and-a-half the depth of the beams in length, and of not less thickness than the beams. All beams for at least three-quarters the length of the vessel in midships, and in addition the beams under the bowsprit, pall bit, windlass and capstan are to be pillared; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper deck, or spar-deck, and to be of the sizes given in Table.

IRON SHEERSTRAKE.—The iron sheerstrake *to be one inch in breadth for every six feet of the vessel's length*, for half her length in midships, and to be of the thickness given in Table; it may then be gradually reduced in breadth and in thickness to three-fourths of the midship breadth and thickness at her ends. The butts of the iron sheerstrake in all cases to be shifted clear of the butts of the stringer plates on the beam ends, the shift in no case to be less than equal to three spaces of frames, and all plates where practicable to be not less than nine feet long, but if the sheerstrake plates are eighteen feet long they may be of two equal breadths, but carvel plated and single rivetted; butts of all plating to be fitted quite close, and in no case is the lower edge of the iron sheerstrake to be fitted less than two-thirds of the breadth required by the Rule for sheerstrake below the upper deck stringer plate. The butt straps in all cases to be in one piece, whether fitted outside or inside, and in no case to be in two pieces by being cut at the stringer plate. *See Section* 30.

IRON BILGE STRAKE.—The bilge strake plates to be two-thirds the breadth of the iron sheerstrake, for three-fifths the length of the keel in midships, and from thence to the ends of the vessel they are to be reduced gradually to one-half their midship breadth; the thickness of the plates to be as prescribed in Table H, and they are to be fitted at the bilges with the middle of the plate at the height prescribed for floorheads, such position for the bilge plates to be maintained, notwithstanding that the floorheads may be carried higher. They are to be extended to the ends of the vessel in accordance with her form, and properly rivetted to the frame.

DIAGONAL PLATES ON FRAMES.—The diagonal plates on the frames to be not less than one-third the breadth of the iron sheerstrake, and fitted in pairs, transversely, all fore and aft, at an angle of 45°, with the butts of each pair meeting between the frames; to be of the thickness given in Table, and connected to the sheer and bilge strake plates by butt straps double rivetted, and to be efficiently rivetted to each other, and to each frame they cross.

STRINGER PLATES.—All vessels to have stringer plates of the thickness given in Table upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one, two, and three decked vessels *to be in width one inch for every seven feet of the vessel's entire length for half her length in midships, and from thence to the ends of the vessel they may be gradually reduced to three-fourths the width in midships*; in no case however is the width in midships to be less than eighteen inches. The stringer plates are to be rivetted to the beams and properly shifted, fitted home, and rivetted to the iron sheerstrake, with an angle iron of the dimensions given in Table, and the roughtree stanchions are not to pass through them. Stringer plates on the ends of beams below the upper deck may be reduced in width to three-fourths the midship breadth of the upper deck stringer, which breadth is to extend all fore and aft, and to have an angle iron of the dimensions given in Table, extending all fore and aft, rivetted to reverse angle iron on each frame and to the stringer plates. In cases where a deck is not laid, and the width of the stringer plate on ends of hold beams is objected to, it may be reduced in width, provided such reduction be fully compensated for. All stringer angle irons are to be in as long lengths as possible, properly shifted, and wherever butted to be connected with angle iron or plate iron not less than two feet long, fitted in the throat of them, properly rivetted to each flange, and the thickness of the connecting plates not to be less than the angle iron they cover. Upper deck gutter waterways are to be flooded to ascertain if there be any leakage, and when completed they are to be properly cemented.

TIE PLATES.—All vessels are to have tie plates ranging all fore and aft upon each side of the hatchways on each tier of beams, and in addition thereto the beams of the upper and middle decks in three decked or spar decked vessels, and of the upper deck in vessels of one or two decks must have tie plates fitted from side to side diagonally, in number one pair for about every 35 feet of the vessel's length; these plates in both cases must not be less in width than once and a half the depth of the beams of their respective decks, and of the thickness required for stringer plates; they are to be well rivetted to each other and to the beams and stringers, and to have intermediate fastenings into the deck plank between the beams, in all cases their butts to be chain rivetted. Upon hold beams where a deck is not to be laid, a tie formed of double angle irons of the size given for the main frames of the ship may be fitted each side of the hatchways in lieu of tie plates, but if the beams are made of such additional strength laterally as not to require the support given by the said angle irons or tie plates, double angle irons of the above size fitted at the centre line, from opening to opening, may be substituted. All hatchways and mast holes are to be properly framed to receive half beams where required, and the latter to have mast partners at each tier of beams (except at orlop beams), the plating of which is not to be less in thickness than is required for stringer plates, and the united breadths of the plates are not to be less than three times the diameter of the masts; these plates to be well rivetted to each other, and to the beams, and angle iron carlings, and at the decks where the masts are to be wedged, an angle iron of the dimensions required for the main frame of the ship is to be properly fitted and rivetted to the plate round the mast hole. The mast holes, skylights, and companions must be properly secured to the satisfaction of the Surveyors. Where wood comings are fitted, plates are to be rivetted to the beams to which the deck ends are to be fastened.

BUTT STRAPS.—Butt straps in all cases, except those of floor plates (*see Section* 13) to be one-sixteenth of an inch thicker than the plates they connect, and to be fitted with the fibre of the iron in the same direction as that of the plates, and rivetted as per Section 4.

BUTT PLATES OF OUTSIDE PLANKING.—The plates to which the butts of the outside planking are to be secured, must be of the breadth of the planks, and extend from frame to frame, efficiently rivetted thereto, and of the thickness given in Table, but on the bows and quarters or wherever else the plank ends may have a tendency to strain off, they are to be one-eighth of an inch thicker than therein prescribed.

RIVETS AND RIVETTING.—The rivets to be of the best quality, and to be of the diameter as per Table, the rivet holes to be regularly and equally spaced, and carefully punched opposite each other in the adjoining parts, from the faying surfaces in the laps, lining pieces, butt straps, and frames, and to be countersunk where required, the rivets not to be nearer to the butts or edges of the plating, lining pieces to butts, or of any angle iron, than a space equal to their own diameter, and not to be further apart from centre to centre than five times their diameter, or nearer than four times their diameter from centre to centre, and to be spaced through the frames and outside plating, and in reversed angle iron a distance equal to nine times their diameter from centre to centre. All butts of iron plating, excepting those of poops and top-gallant forecastles, to be at least double rivetted, and a space equal to twice the diameter of the rivets to be between each row; where treble rivetting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row.

GARBOARD STRAKES.—The garboard strakes not to be less than two-thirds the depth of the keel prescribed in Table, and properly rabbeted into it, to be fitted closely to the iron keel plate, and to be of sufficient width. The butts of the garboard strakes to have not less than four feet six inches shift from the butts of the garboard strake on the opposite side of the vessel, nor less than the same shift clear of the keel scarph. For bolting, *see Section* 33.

PLANKING.—The planking to be thoroughly seasoned, quite free from sap, wane, or other defects, to be wrought with the heart side to the frames, and with not less than three strakes between the butts, without step butting, and with not less than six feet shifts; the garboard strakes to be shifted and of the thickness given in *Section* 7; the bottom planking is not to be less in thickness than prescribed in Table, from the garboard strakes up to within a fifth of the depth of hold set down below the upper deck stringer plate, from thence to the plank sheer to be in thickness as prescribed in Table for topsides; or, if preferred, the bottom planking may retain its thickness up to within a fourth of the depth of the hold set down below the upper deck stringer plate, and from thence to the plank sheer be gradually diminished in thickness to that prescribed in Table for topsides; the thickness of the wood sheerstrakes may be the thickness of the iron sheerstrake they cover less than that prescribed by Table. Outside planks (except the garboard strakes) are not to be more than twelve inches broad; they are to be fitted quite close to the frames and plates, and to each other at their inner edges, and wrought with proper seams outside in proportion to their thickness; the hood-ends may be reduced one-fifth from the thickness given in Table, at the stem or stern-post, and one-third at the buttock. The caulking edge of the keel seam, and hood-end seams of the planking at the stem and stern-post, need not exceed from two and a half inches to four inches, in proportion to the tonnage of the vessel; which can be arranged by trimming the back rabbet from the bearding line as required, so as not to unnecessarily reduce the keel, stem, and stern-post. Furrens or pads are in no case to be used.

DECKS.—The flat of all decks to be of good quality, properly seasoned, free from sap and objectionable knots, the thickness and fastenings as per Table. The upper deck plank to be fastened by screw bolts from the upper side with nuts at the under side of the angle irons of the beams and to the tie plates, *see Section* 29. The bolts must be properly sunk, with oakum and white lead under their heads, and be carefully covered over with turned dowels, their fibre in the same direction as the deck plank, and bedded in white lead, marine glue, or other suitable composition. When the deck planks are six inches in width and under, single fastening will be sufficient; but when they are above six inches and not exceeding eight inches in width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding eight inches in width must be double fastened with nut and screw bolts. If the deck is of Teak it may be one-eighth less in thickness than prescribed in the Table. Upper decks must be renewed when worn in thickness as follows, viz.:—When a deck originally 4 inches thick is worn to 3 inches; 3½ inches to 2¾ inches; 3 inches to 2½ inches.

CEMENT.—All vessels to be efficiently cemented in the bottom to the upper part of the bilges, care to be taken to have proper water courses above the cement all fore and aft.

WINDLASS.—The diameter of main piece of windlasses in Steam Ships may be seven-eighths of that required in the Table, provided always the body of the windlass be not of unusual length.

*Lloyd's Register of Shipping, London, 24th February,* 1870.

# TABLE I.

EXHIBITING THE NUMBER OF YEARS TO BE ASSIGNED TO THE DIFFERENT DESCRIPTIONS OF TIMBER USED IN

# COMPOSITE SHIPS,

*The same to be of good quality, properly seasoned, and free from defects.*

| | TIMBER. | KEEL. | Stem, Sternpost, Apron, Inner Sternpost, Deadwood, Knightheads and Hawse Timbers. | Floors, Wood Frames and Ceiling upon them; Beams and Keelsons. | OUTSIDE PLANK. | | Upper Deck Waterway, Spirketting, Planksheer, and Roughtree Timbers. | RUDDER, WINDLASS, and PALLBITT — Main Pieces. |
|---|---|---|---|---|---|---|---|---|
| | | | | | From Top of Keel to Two-fifths the Depth of Hold *(a)* | From Two-fifths the Depth of Hold *(a)* to Gunwale. | | |
| 1 | East India Teak ..... | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 2 | Greenheart, Morra, Iron Bark | 14 | 12 | 12 | 14 | 12 | 12 | 14 |
| 3 | *(b)* Live Oak, English, African, French, Adriatic, Italian, Spanish, and Portuguese Oaks ..... | 14 | 12 | 12 | 12 | 12 | 12 | 14 |
| 4 | Pitch Pine, Oregon and Huon Pine, Larch, Hackmatack, Cowdie or Kaurie Pine .. | 9 | 9 | 9 | 12 | 10 | 10 | — |
| 5 | *(b)* Northern Continental Oak | 12 | 9 | 9 | 12 | 10 | 10 | 9 |
| 6 | *(b)* American White Oak .... | 10 | 7 | 7 | 10 | 8 | 7 | 7 |
| 7 | Dantzic, Memel, Riga, and American Red Pine ..... | 9 | 8 | 8 | 10 | 9 | 10 | — |
| 8 | American Rock Elm ..... | 16 | — | 8 | 16 | 6 | 6 | — |
| 9 | *(c)* English and French Elm, and Beech..... | 16 | — | — | 16 | — | — | — |
| 10 | Spruce Fir, Swedish and Norway Red Pine..... | — | — | — | 8 | 8 | — | — |

*(a)* That is, two-fifths the depth of hold taken from the top of floors to the top of upper or tonnage deck beams, set up from the keel plate, in midships; which height is not to be exceeded fore and aft on a straight line.

*(b)* Live Oak, English, French, Adriatic, Italian, Spanish, and Portuguese Oak will be allowed to be used for stems, and for the bow and buttock planks where East India Teak would be liable to break in working, in vessels otherwise built of 16 years' timber material.

*(b)* Whenever any of the Oaks, or other woods of an acid nature are used, the best Hair Felt, Canvas, or other approved material, in addition to paint, is to be placed between them and the Iron Plates and Angle Irons.

*(c)* English and French Elm allowed for Garboard Strakes and Planking of flat of bottom in Ships of the 16 years' grade.

Where parties are desirous of using Woods not inserted in the Table, special application to be made to the Committee.

*Lloyd's Register of Shipping, London, 29th May*, 1879.

[SEE OVER.]

# TABLE K.

Exhibiting the Sizes of Bolts, and Pintles of Rudder, in **Composite Ships.**

| Tonnage. | Deadwood Keel *(b)* Stem *(a)* and Stern Post Bolts. | Bottom Plank, Scarphs of Keel, and Thwartship Garboard, Bolts. | Topside, Waterway, and Plankshear Bolts. | Chain Plate Bolts. | Pintles of Rudder. | Tonnage. |
|---|---|---|---|---|---|---|
| 50 and under 100 | $\frac{7}{8}$ | $\frac{10}{16}$ | $\frac{9}{16}$ | $\frac{13}{16}$ | 2 | 50 and under 100 |
| 100 and under 200 | 1 | $\frac{10}{16}$ | $\frac{9}{16}$ | $\frac{7}{8}$ | $2\frac{1}{4}$ | 100 and under 200 |
| 200 and under 300 | $1\frac{1}{16}$ | $\frac{12}{16}$ | $\frac{10}{16}$ | 1 | $2\frac{1}{2}$ | 200 and under 300 |
| 300 and under 400 | $1\frac{1}{16}$ | $\frac{12}{16}$ | $\frac{10}{16}$ | $1\frac{1}{8}$ | $2\frac{3}{4}$ | 300 and under 400 |
| 400 and under 500 | $1\frac{1}{16}$ | $\frac{13}{16}$ | $\frac{11}{16}$ | $1\frac{1}{8}$ | 3 | 400 and under 500 |
| 500 and under 600 | $1\frac{1}{8}$ | $\frac{13}{16}$ | $\frac{11}{16}$ | $1\frac{1}{8}$ | $3\frac{1}{8}$ | 500 and under 600 |
| 600 and under 700 | $1\frac{1}{8}$ | $\frac{14}{16}$ | $\frac{12}{16}$ | $1\frac{1}{4}$ | $3\frac{1}{4}$ | 600 and under 700 |
| 700 and under 800 | $1\frac{1}{8}$ | $\frac{14}{16}$ | $\frac{12}{16}$ | $1\frac{1}{4}$ | $3\frac{1}{2}$ | 700 and under 800 |
| 800 and under 900 | $1\frac{3}{16}$ | $\frac{15}{16}$ | $\frac{13}{16}$ | $1\frac{1}{4}$ | $3\frac{1}{2}$ | 800 and under 900 |
| 900 and under 1000 | $1\frac{3}{16}$ | $\frac{15}{16}$ | $\frac{13}{16}$ | $1\frac{3}{8}$ | $3\frac{5}{8}$ | 900 and under 1000 |
| 1000 and under 1200 | $1\frac{1}{4}$ | 1 | $\frac{14}{16}$ | $1\frac{3}{8}$ | $3\frac{5}{8}$ | 1000 and under 1200 |
| 1200 and under 1500 | $1\frac{5}{16}$ | 1 | $\frac{14}{16}$ | $1\frac{3}{8}$ | $3\frac{3}{4}$ | 1200 and under 1500 |
| 1500 and under 2000 | $1\frac{6}{16}$ | $1\frac{1}{16}$ | $\frac{15}{16}$ | $1\frac{1}{2}$ | $3\frac{7}{8}$ | 1500 and under 2000 |
| 2000 and under 2500 | $1\frac{7}{16}$ | $1\frac{2}{16}$ | 1 | $1\frac{1}{2}$ | 4 | 2000 and under 2500 |
| 2500 and under 3000 | $1\frac{8}{16}$ | $1\frac{2}{16}$ | 1 | $1\frac{5}{8}$ | $4\frac{1}{8}$ | 2500 and under 3000 |
| 3000 and under 3500 | $1\frac{8}{16}$ | $1\frac{3}{16}$ | $1\frac{1}{16}$ | $1\frac{3}{4}$ | $4\frac{1}{8}$ | 3000 and under 3500 |

| Tons. .....under | 150 | 150 and under 500 | 500 and under 1000 | 1000 and under 2000 | 2000 and under 3000 |
|---|---|---|---|---|---|
| *(a)* Number of Bolts in Scarphs of Keels. | 6 | 7 | 8 | 9 | 10 |

The length of the keel scarphs to be five times the mean of the siding and moulding of the keel.

*(a)* Stem Scarphs are not to be less than seven-tenths the length of the Keel Scarphs, and all Scarphs are to be Tabled.

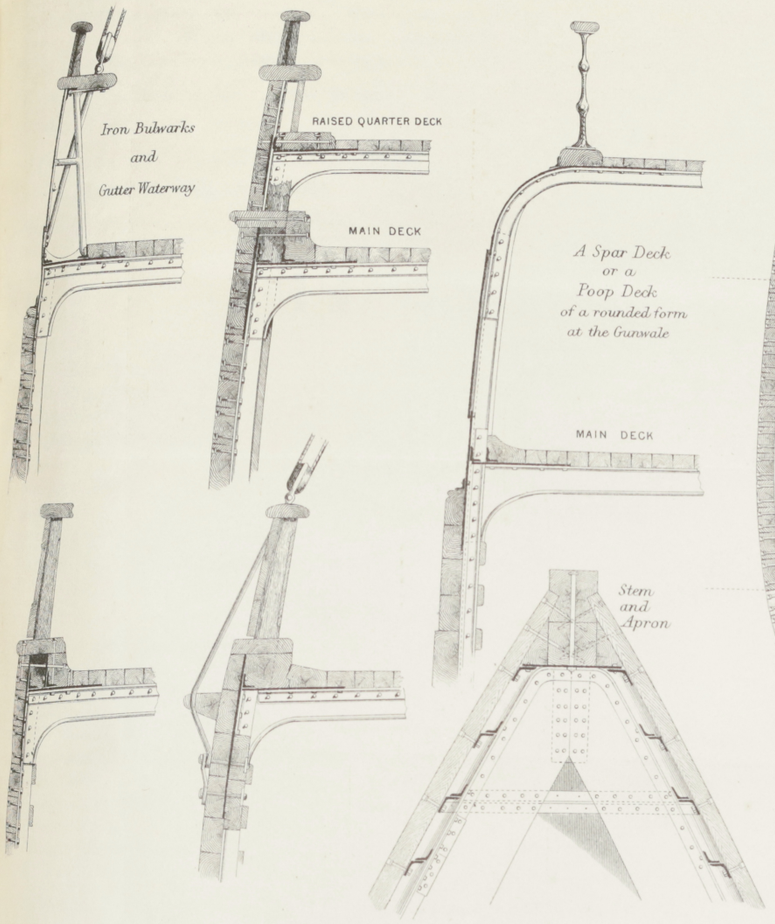
Bolts. 33.—The bolts to be not less than the sizes given in Table, the garboard strakes to be cross-bolted from side to side, with bolts not exceeding four feet six inches apart.

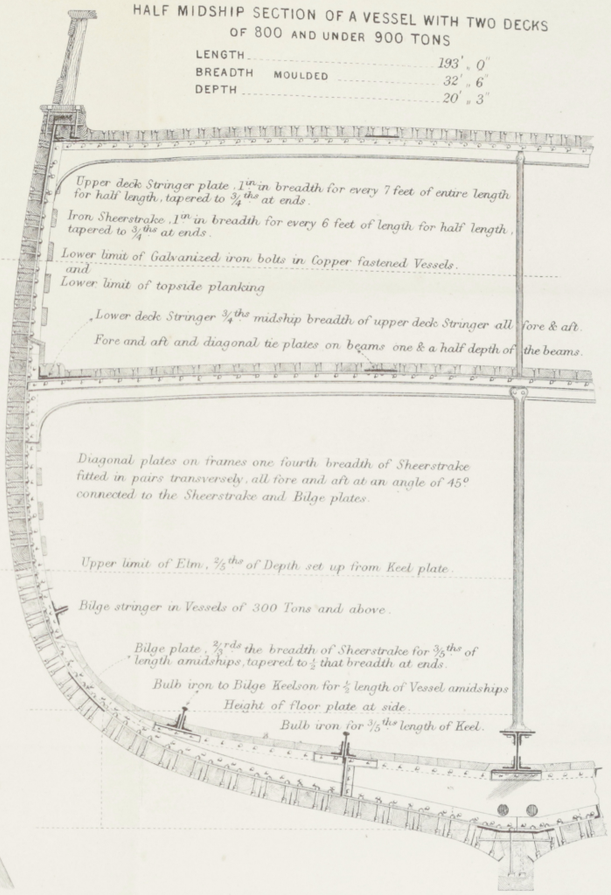
*(b)* The wood keel to have a vertical bolt through the keel plate between each frame. The stem, stern-post, deadwood, and remainder of the keel, to be through fastened in all cases, and the bolts spaced as in the keel. The screw pointed bolts for fastening the planking when less than five inches thick to be of such form under the heads, as will prevent them from turning, their heads to be once and three-quarters the diameter of the bolts, and two-fifths their diameter in thickness, the nuts in all cases to be of the same description of metal as the bolts they are applied to, and to be in thickness equal to their diameter, and not to have less substance than three-eighths the diameter of the bolts in any part, whatever the form may be, hexagon form being preferred. All outside planks ten inches broad and above, to be double fastened; eight inches-and-a-half and under ten inches, double and single fastened alternately; and under eight inches-and-a-half single fastened; and all butts to be double fastened. The bolt holes in the outside planking to be enlarged with a dowelling machine for the bolt heads, which in the bottom up to within one-fifth the depth of hold set down below the upper deck stringer plate are to be sunk within the surface of the planking one inch and a quarter, when dowels are intended to be used; from thence to the plankshear they need not be sunk more than three-quarters of an inch; the bolts to be properly driven with oakum and white lead, putty, marine glue, or other suitable composition under their heads, and in the bottom they are to be carefully covered (after the seams of the bottom are all caulked) with turned well seasoned wood dowels, the fibre of which must be in the same direction as the planking, and be driven with white lead, marine glue, or any other approved composition. Where copper or yellow metal bolts are used, the sinking of them within the surface of the planking to be optional to the above extent.

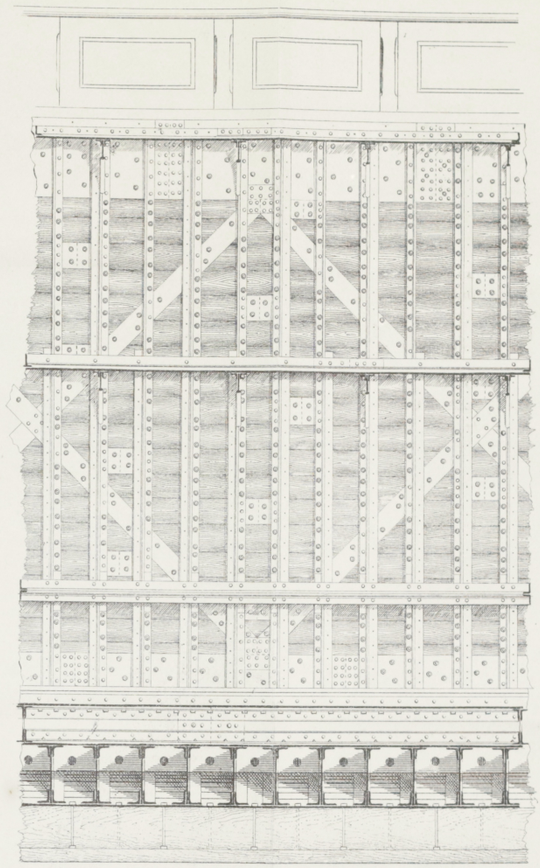
# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

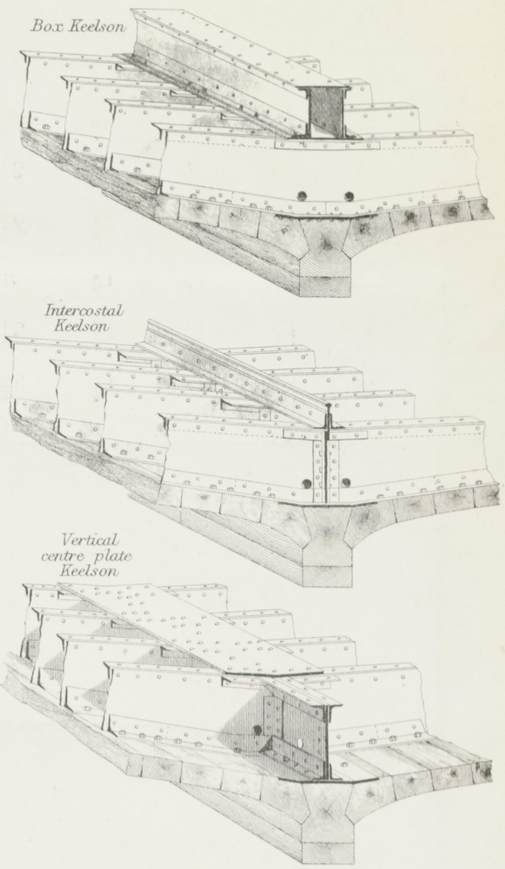
## ILLUSTRATIONS OF THE SUGGESTIONS FOR THE CONSTRUCTION AND CLASSIFICATION OF COMPOSITE SHIPS

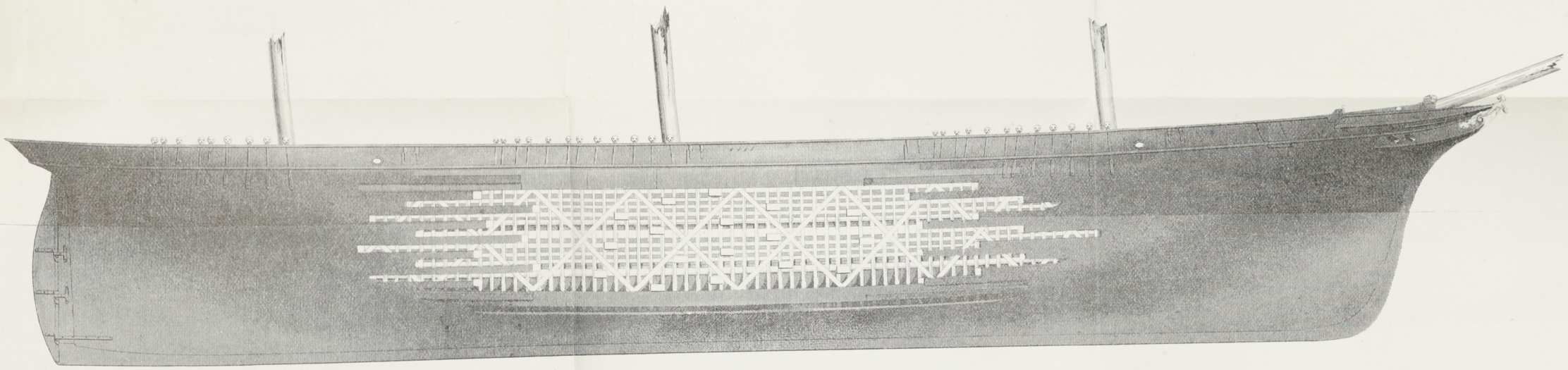
1868.





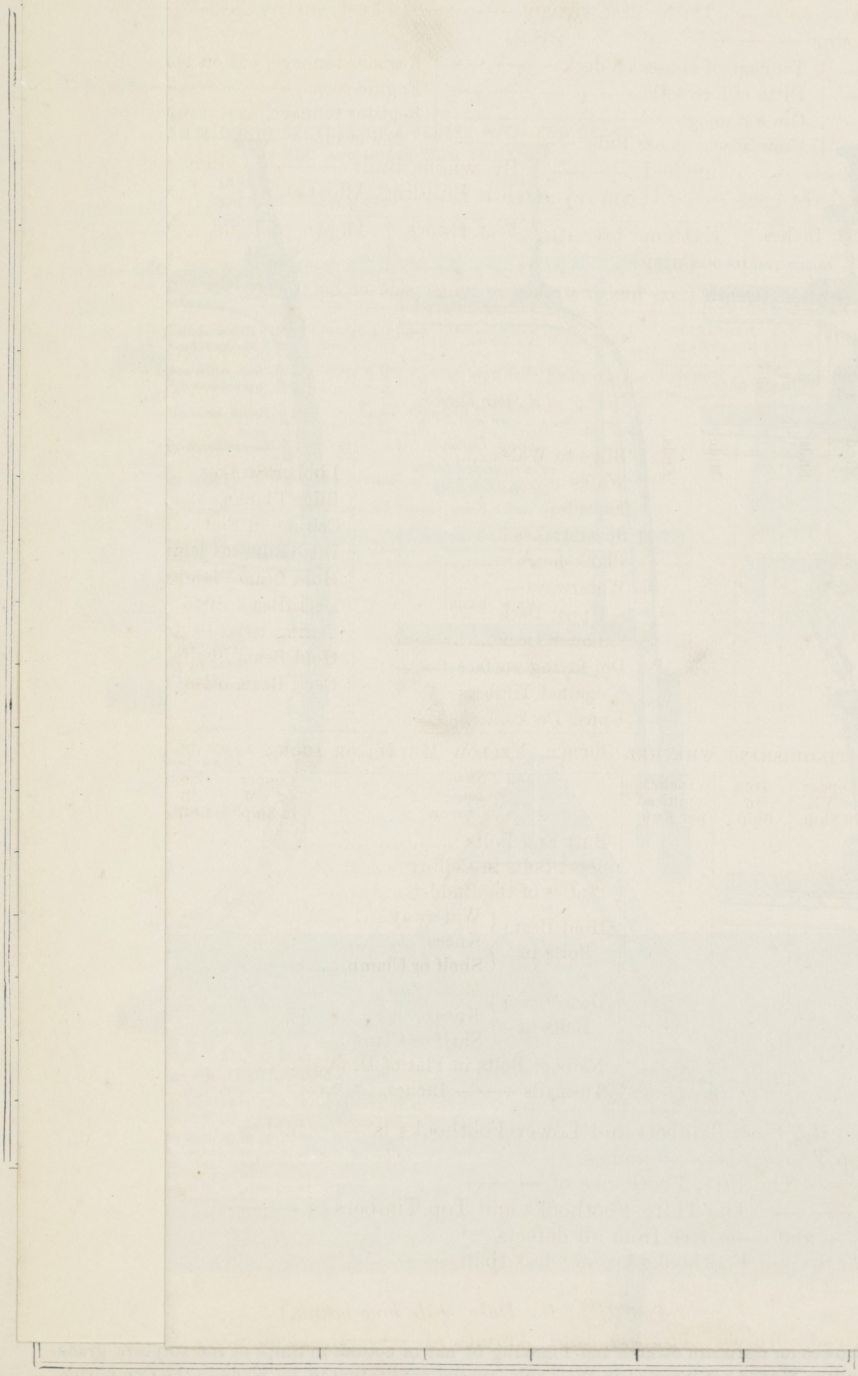



Drawn by H. Cornish, Lloyd's Surveyor

Printed by Robt Edmd Taylor, 19, Old Street, London.

T.W. Lee, Sculp

Lloyd's Register of Shipping, London, 24th February, 1870.



# FORM OF REPORT.

FORM No. 1 FOR WOOD SHIPS.—FORM OF THE REPORT OF ORIGINAL SURVEY.

No. —— Survey held at ———— Date, first survey ———— Last survey ———— 18—
on the ———— Master ————

Official Number————————
Tonnage under tonnage deck ————
Ditto of spardk. or awning dk.————
Ditto of poop, or raised qr. dk.————

Tonnage of houses on deck ————
Ditto of forecastle————————
Gross tonnage ————————
Crew space, as per Rule ————————

Register tonnage, cut on beam ——
Engine-room ————————
Register tonnage, as a steamer, cut on the beam————————

Built at ——— When built ——— Launched ——— By whom built ——— Owners ———
Port belonging to——— Destined voyage——— If Surveyed while Building, Afloat, or in Dry Dock———

Length as per Section 39.....Feet. Inches.
Length of Keel..... .....

Extreme breadth...Feet. Inches.
outside.....

Depth of Hold...Feet. Inches.

Number of Decks ———— (Depth from limber-strakes to under side of lower deck beam ————)

| SCANTLINGS OF TIMBER. | IN SHIP. | | | REQUIRED PER RULE. | | |
|---|---|---|---|---|---|---|
| | Sided. | Moulded. Middle. | Moulded. Ends. | Sided. | Moulded. Middle. | Moulded. Ends. |
| Timber and Space..... | | | | | | |
| Floors..... | | | | | | |
| 1st Foothooks ..... | | | | | | |
| 2nd Ditto ..... | | | | | | |
| 3rd Ditto ..... | | | | | | |
| Top Timbers..... | | | | | | |
| Deck Beams No. —{ Average Space. | | | | | | |
| Deck Beams, length amidships | | | | | | |
| Hold Beams No. —{ Average Space. | | | | | | |
| Hold Beams, length amidships | | | | | | |
| Keel ..... ..... | | | | | | |
| Scarphs of Ditto ..... | | | | | | |
| Keelsons ..... | | | | | | |
| Scarphs of ditto ..... | | | | | | |

| OUTSIDE PLANK. | Inches. In ship. | Inches. Required per Rule. |
|---|---|---|
| Garboard Strakes... | | |
| Garboard to Bilge.. | | |
| Bilge Planks ..... | | |
| Bilge to Wales..... | | |
| Wales ..... | | |
| Topsides ..... | | |
| Sheerstrakes..... | | |
| Plankssheers ..... | | |
| Waterways— | | |
| Upper Deck ..... | | |
| Lower Deck ..... | | |
| Do. faying surface against Timbers | | |
| Upper Deck..... | | |

Dimensions of Ship per Register.
length—breadth—depth—

| INSIDE PLANK. | Inches. In ship. | Inches. Required per Rule. |
|---|---|---|
| Limber Strakes ... | | |
| Bilge Planks ..... | | |
| Ceiling in Flat..... | | |
| Ditto Bilge to Clamp | | |
| Hold Beam Clamps | | |
| Deck Beam ditto... | | |
| Ceiling 'twixt Decks | | |
| Hold Beam Shelfs. | | |
| Deck Beam ditto ... | | |

SIZE OF BOLTS IN FASTENINGS, DISTINGUISHING WHETHER COPPER, YELLOW METAL, OR IRON; ALSO OF TREENAILS.

| | Copper or YM. in Ship. | Iron in Ship. | Inches required per Rule. |
|---|---|---|---|
| Heel-Knee and Deadwood abaft ... | | | |
| Scarphs of Keel, No..... | | | |
| Keelson Bolts through Keel at each Floor ..... | | | |
| Bolts through Heels of Timbers against Deadwood ..... ..... | | | |
| Frame Bolts ..... ..... | | | |
| Transoms and Throats of Hooks ... | | | |
| Arms of Hooks ..... | | | |
| Through Bilge and Limber Strak s | | | |
| Thickstuff over Double Floors..... | | | |

| | Copper or YM. in Ship. | Iron in Ship. | Inches required per Rule. |
|---|---|---|---|
| Butt End Bolts ..... ..... | | | |
| Short Bolts in Ceiling ..... | | | |
| Pintles of the Rudder..... | | | |
| Hold Beam Bolts in { Waterway..... ..... | | | |
| Hold Beam Bolts in { Knees ..... | | | |
| Hold Beam Bolts in { Shelf or Clamp..... | | | |
| Deck Beam Bolts in { Waterway..... | | | |
| Deck Beam Bolts in { Knees ..... | | | |
| Deck Beam Bolts in { Shelf or Clamp..... | | | |
| Nails or Bolts in Flat of Deck ... | | | |
| Treenails ——— Inches..... | | | |

TIMBERING.—The Space between the Floor Timbers and Lower Foothooks is —— inches.
The Space between the Top Timbers is —— inches.
The Floors consist of ——— The First Foothooks of ———
The Second Foothooks of ——— The Third Foothooks and Top Timbers of ———
The Main Keelson is ——— and —— free from all defects.
The Shifts of the First and Second Foothooks are not less than ——
(The Rider Keelson is ———)
[*N.B.—When less than prescribed by the Rule, state how many.*]
The Transoms, Knight Heads, Hawse Timbers, and Aprons, of ——— Deadwood, of ———
and —— The Stem and Stern Post of ———— free from all defects.
The Deck and Hold Beams of —— The Breasthooks of —— The Knees of —— The Main piece of Rudder of ——— Windlass of ——— (The Keel of ———)

The rest of the Shifts of the Frame are —— The Frame is —— squared from the First Foothook heads upwards, and —— free from sap, and from thence downwards the Frame is ——

The —— Frames are —— bolted together to the gunwale. [*N.B.—If not, state how bolted.*]

The butts of the Timbers are —— close together; their thickness not less than —— of the entire moulding at that place.

The Frame is —— chocked with ——Butt at each end of the chock.

PLANKING OUTSIDE.—From the top of the keel to two-fifths the depth of Hold, the Plank is ——— From the above-named height to the Wales ———

The Wales and Blackstrakes ——— The Topsides and Sheerstrakes ———

The Spirketting and Planksheers ——— The Waterways { Upper Deck ——— / Lower deck ———

The Decks ——— State of ———

The Shifts of the Planking are not less than —— set —— inches. [*N.B.—If less than prescribed by the Rule, state whether general or partial, and if partial, in what part of the Ship.*]

The Planking is wrought ——— between, *and without step-butting.*

PLANKING INSIDE.—The Limber-strakes and Bilgestrakes are———

The Ceiling, Lower Hold, and between Decks ——— Shelf Pieces and Clamps ———

FASTENINGS.—To Hold Beams ——— Deck Beams ———

Number of Breasthooks ——— Pointers ——— Crutches ———

Butt End Bolts are of ——— in the Bottom ——— Bolts in each Butt End ——— through and clenched. Bilge and Limber Strakes ——— bolted through and clenched.

Treenails of ——— How made ——— Thickstuff over Double Floors ——— bolted through and clenched. General Quality of Workmanship ———

*We certify that the above is a correct description of the several particulars therein given,*

*Builder's Signature* ——— *Surveyor's Signature* ———

| No. | SAILS. | CABLES, &c. | Fthms | in. | Test as per Certif. | Inches reqr'd pr. rule | Test reqr'd. pr. rule | ANCHORS, &c. | No. | Wght. ex Stock. | Test as per Certif. | Wght. reqr'd. pr. rule | Test reqr'd. pr. rule |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fore Sails, | Chain* ..... | | | | | | | | | | | |
| | Fore Top Sails, | Hempen Stream Cable | | | | | | | | | | | |
| | Fore Topmast Stay | Hawser ..... | | | | | | Bowers* ... | | | | | |
| | Sails, | Towlines ..... ..... | | | | | | Stream..... | | | | | |
| | Main Sails | Warp | | | | | | | | | | | |
| | Main Top Sails, and | All of —— quality | | | | | | Kedges..... | | | | | |

* State Machine where Tested, Date or No. of Certificate, and name of Superintendent.

Her Masts, Yards, &c. are in ——— condition, and sufficient in size and length.

Her standing and running Rigging ——— sufficient in size and ——— in quality.

She has ——— Long Boat and ——— The present state of the Windlass is ———

Capstan ——— and Rudder ——— Pumps ———

SCUPPEES, &c.—What arrangements are there beyond the scuppers on deck, for clearing upper deck of water, in case of a sea coming on board? ———

CARGO HATCHWAYS.—How formed? ——— State size ——— If of extraordinary size, state how framed and secured? ——— What arrangements for shifting beams? ———

HATCHES, themselves, whether strong and efficient?—— MAIN HATCHWAYS.—State size ——

Order for Special Survey, No. — Date ———

Order for Ordinary Survey, No. — Date ———

No.——in Builder's Yard.

Dates of Surveys held while building, as per Section 35.

1st. When the Frame is completed ———

2nd. When the Beams are put in, &c. ———

3rd. When completed, and before the plank be painted or payed ———

*General Remarks.*

Present condition of Caulking of Bottom ——— Deck ——— and Waterways ———

If Sheathed, Doubled, Felted, Coppered, or Yellow Metalled ——— When last done ———

I am of opinion this Vessel should be classed ———

The amount of the Entry Fee.....£ : : is received by me, }

Special .....£ : : ———188— } ———

Certificate..... : : *Surveyor.*

{*Travelling Expenses, if any,* £——.)

*Committee's Minute*———18— *Character assigned* ———

# FORM OF REPORT.

FORM No. 1 FOR IRON SHIPS.

No. —— Survey held at ———— Date, first survey ———— Last survey ———— 18— on the ———— Master ————.

Official number ————————————————
Tonnage under tonnage deck ————————————————
Ditto of third, spar, or awning deck ————————————————
Ditto of poop or raised quarter deck ————————————————
Ditto of houses on deck ————————————————
Ditto of forecastle ————————————————
Gross tonnage ————————————————
Less crew space ————————————————
————————————————
Less engine-room ————————————————
Register tonnage, as cut on beam ————————————————

ONE OR TWO-DECKED, THREE-DECKED VESSEL, SPAR, OR AWNING-DECKED VESSEL.

| | Feet. |
|---|---|
| Half-breadth (moulded) | |
| Depth from upper part of keel to top of upper deck beam | |
| Girth of half midship frame (as per rule) | |
| 1st Number | |
| 1st Number, if in three-decked vessel deduct 7 ft. | |
| Length | |
| 2nd Number | |
| Proportions, breadths to length | |
| Depths to length, upper deck to keel | |
| Ditto main deck ditto | |

Built at—— When built —— Launched —— By whom built —— Owners —— Residence ——
Port belonging to —— Destined voyage —— If Surveyed while Building, Afloat, or in Dry Dock ——

| | Feet. | Inches. | | Horse. | |
|---|---|---|---|---|---|
| Length on deck, as per rule | | | | | |
| Breadth, Moulded | | | | | |
| Depth top of Floors to Upper Deck Beams | | | Power of Engines | | No. of Decks with flat laid ——— |
| Ditto, Main Deck Beams | | | | | No. of Tiers of Beams ——— |

Dimensions of Ship per Register, length——breadth——depth——depth moulded——

| | Inches in Ship. | | | Inches per Rule. (Class ) | | |
|---|---|---|---|---|---|---|
| | In Ship. | | | Required per Rule. | | |
| | Inches. | Inches. | 16ths. | Inches. | Inches. | 16ths. |
| Keel, depth and thickness | | | | | | |
| Stem, moulding and thickness | | | | | | |
| Stern-post for Rudder, do. do. | | | | | | |
| ,, for Propeller | | | | | | |
| Distance of Frames from moulding-edge to moulding-edge, all fore and aft | | | | | | |
| Frames, Angle Iron, for ⅔ length amidships | | | | | | |
| ,, for ⅓ at each end | | | | | | |
| Reversed Frames, Angle Iron | | | | | | |
| Floors, depth and thickness of Floor Plate at mid line for half length amidships | | | | | | |
| ,, thickness at ends of vessel | | | | | | |
| ,, depth at ⅔ the half-breadth, as per Rule | | | | | | |
| ,, height extended at bilges | | | | | | |
| Beams, Upper Spar, or Awning Deck, single or double Angle Iron, Plate or Tee Bulb Iron | | | | | | |
| ,, Single or double Angle Iron on upper edge | | | | | | |
| ,, Average space | | | | | | |
| ,, Main or Middle Deck, single or double Angle Iron, Plate or Tee Bulb Iron | | | | | | |
| ,, Single or double Angle Iron on upper edge | | | | | | |
| ,, Average space | | | | | | |
| ,, Lower Deck,—single or double Angle Iron, Plate or Tee Bulb Iron | | | | | | |
| ,, Single or double Angle on Iron upper edge | | | | | | |
| ,, Average space | | | | | | |
| ,, Hold, or Orlop,—single or double Angle Iron, Plate or Tee Bulb Iron | | | | | | |
| ,, Single or double Angle Iron on upper edge | | | | | | |
| ,, Average space | | | | | | |
| Keelsons, centre line, single or double plate, box, or intercostal, Plates | | | | | | |
| ,, Rider Plate | | | | | | |
| ,, Bulb Plate to Intercostal Keelson | | | | | | |
| ,, Angle Irons | | | | | | |
| ,, Double Angle Iron Side Keelson | | | | | | |
| ,, Side Intercostal Plate | | | | | | |
| ,, ,, Angle Irons | | | | | | |
| ,, Attached to outside plating with Angle Iron | | | | | | |
| Bilge Angle Irons | | | | | | |
| ,, ,, Bulb Iron | | | | | | |
| ,, ,, Intercostal Plates riveted to plating for —— length | | | | | | |
| ,, Stringer Angle Irons | | | | | | |
| Intercostal Plates riveted to plating for —— length | | | | | | |
| Side Stringer Angle Irons | | | | | | |

| | Required In Ship. per Rule. | | | |
|---|---|---|---|---|
| | Inches. | 16ths. | Inches. | 16ths. |
| Flat Keel Plates, breadth and thickness | | | | |
| Plates in Garboard Strakes, breadth and thickness from Garboard to upper part of Bilges | | | | |
| ,, of doubling at Bilge, or increased thickness, and length applied | | | | |
| ,, from upper part of Bilge to lower edge of Sheerstrake | | | | |
| ,, Main Sheerstrake, breadth and thickness | | | | |
| ,, of doubling at Sheerstrake, and length applied | | | | |
| ,, from Main to Upper or Spar Deck Sheerstrake | | | | |
| ,, Upper or Spar Deck Sheerstrake breadth and thickness | | | | |
| Butt Straps to outside plating, breadth and thickness | | | | |
| Lengths of Plating | | | | |
| Shifts of Plating, and Stringers | | | | |
| Gunwale Plate on ends of Awning, Spar, or Upper Deck Beams, breadth and thickness | | | | |
| Angle Iron on ditto | | | | |
| Tie Plates (fore and aft), outside Hatchways | | | | |
| Diagonal Tie Plates on Beams (No. of pairs, ) | | | | |
| [State clearly where plating is of alternate thicknesses—as distinguished from diminished thickness at ends of vessel ] | | | | |
| Flat of Upper, Spar, or Awning Deck* | | | | |
| How fastened to Beams | | | | |
| Stringer Plate on ends of Main or Middle Deck Beams, breadth and thickness (*Is the Stringer Plate attached to the outside plating?*) | | | | |
| Angle Irons on ditto (No. ) | | | | |
| Tie Plates, outside Hatchways | | | | |
| Diagonal Tie Plates on Beams (No. of pairs, ) | | | | |
| Flat of Middle Deck,* ditto ditto | | | | |
| How fastened to Beams | | | | |
| Stringer Plate on ends of Lower Deck, Hold, or Orlop Beams (*Is the Stringer Plate attached to the outside plating?*) | | | | |
| Angle Iron ditto (No. ) | | | | |
| Stringer or Tie Plates, outside Hatchways | | | | |
| Flat of Lower Deck* | | | | |
| Ceiling betwixt Decks, thickness and material | | | | |
| ,, in hold ditto ditto | | | | |
| Main piece of Rudder, diameter at head | | | | |
| ,, ,, ,, ,, at heel | | | | |

* If Iron Deck, state if whole or part, and if wood deck is laid thereon.

(*Can the rudder be unshipped afloat?*————)
Bulkheads, No.———— No. per Rule———————— Thickness of————————
Ditto, Height up———————————— How secured to sides of ship————————
Ditto, Size of Vertical Angle Irons, ———————— and distance apart, ———————— inches.
Ditto, Are the outside Plates doubled two spaces of Frames in length?————————
The Frames extend in one length from ———— to ———— riveted through plates with —— in. rivets, about —— apart.
The Reversed Angle Irons on floors and frame extend ———————— middle line to ———————— and to ———————— alternately.
Keelsons. Are the various lengths of plates and angle irons properly connected? ———— And butts properly shifted? ————
Plating. Garboard, double riveted to keel, with rivets —— in. diameter, averaging —— inches from centre to centre.
„ Edges of Garboards and to upper part of bilge, worked clencher, double riveted; with rivets —— in. diameter, averaging —— inches from centre to centre.
„ Butts from Keel to turn of Bilge, worked carvel, double riveted; with rivets —— in. diameter, averaging —— inches from centre to centre.
„ Butts of ———————— strakes at Bilge for ———————— length, treble riveted with butt straps ———————— thicker than the plates they connect.
„ Edges from Bilge to Main Sheerstrake, worked clencher, double or single riveted; with rivets —— in. diameter, averaging —— inches from centre to centre.
„ Butts from Bilge to Main Sheerstrake, worked carvel, double riveted; with rivets —— in. diameter, averaging —— inches from centre to centre.
„ Edges of Main Sheerstrake, double or single riveted. Upper Sheerstrake, double or single riveted.
„ Butts of Main Sheerstrake, treble riveted for ———— length amidships. Butts of Upper or Spar Sheerstrake, treble riveted ———— length amidships.
„ Butts of Main Stringer Plates, treble riveted for ———— length amidships. Butts of Upper or Spar Stringer Plate, treble riveted for ———— length.
„ Breadth of laps of plating in double riveting ————. Breadth of laps of plating in single riveting ————.
Butt Straps of Keelsons, Stringer and Tie Plates, treble, double, or single riveted?————
No. of breasthooks ———— crutches ————
What description of iron is used for Frames, Beams, Keelsons, Tie and Stringer Plates, Outside Plating, &c.?
Manufacturer's Name or Trade Mark ————

*The above is a correct description.*

———————— *Builder's Signature.* ———————— *Surveyor's Signature.*

*Surveyor to Lloyd's Register of British and Foreign Shipping.*

Workmanship.—Are the butts of plating planed or otherwise fitted?————
Do the edges of the carvel work and of the butts fay close together throughout their length without requiring any making good of deficencies?————
Are the fillings between the ribs and plates solid single pieces?————
Do the holes for riveting plate to frames, butt straps, or plate to plate, &c., conform well to each other?————
Are the rivet holes well and sufficiently countersunk in the plate and punched from the faying surfaces?——
Do any rivets break into or through the seams or butts of the plating? ————
Masts, Bowsprit, Yards, &c. are ———— in ———— condition, and sufficient in size and length.

*If of Iron or Steel, give Scantlings of Plating, Angle Irons, &c., and further explain by a Sketch, showing how the lower Masts and Bowsprit are constructed, showing the number of Plates and Angle Irons, mode of riveting, quality of Materials, and if stamped with Maker's name.*

State also Length and Diameter of Lower Masts and Bowsprit ————.

No. FOR EQUIPMENT———

| No. | SAILS. | CABLES, &c. | Fthms. | In. | Test per Certif. | Inches per Rule. | Machine where testd. & Suprntdt. | ANCHORS, &c. | No. | W'ght. of Stock. | Test per Certif. | Weight required per Rule. | Machine where tested, & Suprintndt. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Foresails | Chain* ..... | | | | | | Bower* ..... | | | | | |
| | Fore Top Sails | Iron Stream Chain or Steel Wire..... | | | | | | Stream ..... | | | | | |
| | Fore Topmast Stay Sails | or Hempn StrmCable Towline, Hemp or Steel Wire ..... | | | | | | Kedge ..... | | | | | |
| | Main Sails | Hawser ..... | | | | | | 2nd Kedge . | | | | | |
| | Main Top Sails, and | Warp ..... | | | | | | | | | | | |
| | | Quality..... | | | | | | | | | | | |

* State Machine where Tested, Date or No. of Certificate, and Name of Superintendent.

Standing and Running Rigging ———— sufficient in size, and ———— in quality.
She has ———— Long Boat and ————
The Windlass is ———— Capstan ———— and Rudder ———— Pumps ————

ENGINE ROOM SKYLIGHTS.—How constructed?—— How secured in ordinary weather?—— What arrangements for deadlights in bad weather?————

COAL BUNKER OPENINGS.—How constructed? How are lids secured?—— Height above deck?——

SCUPPERS, &c.—What arrangements for clearing upper deck of water, in case of shipping a sea?——

CARGO HATCHWAYS.—How formed?———— State size MAIN HATCH ———— Forehatch———— Quarter-hatch ———— If of extraordinary size, state how framed and secured?— What arrangement for shifting beams?—— Hatches, if strong and efficient?——

*Reference should be made to any correspondence connected with the case.*

Order for Special Survey No. ——
Date————————
Order for Ordinary Survey No. ——
Date ————————
No.——in Builder's Yard.

Dates of Surveys held while building, as per Section 18.

1st. On the several parts of the frame, when in place, and before the plating was wrought ———
2nd. On the plating during the process of riveting——
3rd. When the beams were in and fastened, and before the decks were laid ——
4th. When the ship was complete, and before the plating was finally coated or cemented——
5th. After the ship was launched and equipped ———

State dates of letters respecting this case ————————

GENERAL REMARKS. *(State quality of Workmanship, &c.)*

*State if one, two, or three-decked vessel, or if spar or awning decked, and the lengths of poop, bridge, fore castle, or raised quarter deck. (If double bottom, state particulars on separate form.)*

How are the surfaces preserved from oxidation? Inside ———— Outside ————

I am of opinion this vessel should be classed ————

The amount of the Entry Fee .....£ : : is received by me, }
Special .....£ : : ——— 188— } ————————

*(To be sent as per margin.)* Certificate .....
*Travelling Expenses (if any)* £————

*Committee's Minute* ———— 188 —
*Character assigned* ————

*(The Surveyors are requested not to write on or below the space for Committee's Minute.)*

————————————

*Surveyor to Lloyd's Register of British and Foreign Shipping.*

## Form No. 2 for REPORT OF SURVEY FOR REPAIRS, etc.

No. —— Port of ——— Survey held at ——— Date, First Survey ——— Last Survey ———
18 —— on the ——— Master——— Tonnage ———Built at ——— By whom ——— When ———
Owners———— Port belonging to ——— Owner's Address ——— If Surveyed afloat or in dry dock ——— Name of Dock ——— Destined Voyage ———
Length of Poop —— ft.; of Forecastle —— ft.; of Raised Qr. Deck —— ft.; Moulded Deth — ft. —ins.
Last Survey, No. ——— Port ——— Classed ———
Repairs or Examination as per Rule ———

Present condition of the

| | | |
|---|---|---|
| Decks ..... | Breasthooks and Stemson ..... | Caulking of Bottom, Deck, and Waterways ..... |
| Waterways ..... | Transoms, Pointers, and Crutches..... | Copper, or Y. M....When put on ... |
| Comings ..... | Timbers of Frame at the openings ... | Boats..... |
| Upper Deck Beams and Fastenings | Ditto at other places ..... | Masts, Yards, &c. ..... |
| Lower Deck Beams and Fastenings | Keelsons..... | Conditions, how ascertained ..... |
| Planksheers ..... | Clamps and Shelfs ..... | Sails ..... |
| Sheerstrakes..... | Ceiling ..... | Anchors, No. of ..... |
| Topsides ..... | Rudder ..... | Cables ..... |
| Wales ..... | Windlass and Capstan ..... | Hawsers and Warps ..... |
| Plank (Bottom) and Counter..... | Pumps ..... | Standing and Running Rigging ... |
| Treenails and Rivets ..... | Cement (if Iron Ship) ..... | |

Engine Room Skylights ——— Coal Bunker, Openings, Lids, &c. ——— Scuppers ———
Cargo and Main Hatchways ——— Hatches ———

*General Observations, Opinionas to Class, &c.*

Committee's Minute ——— 18
Character assigned ———

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## No. 7.—FORM OF CERTIFICATE OF CHARACTER.

### *Lloyd's Register of British and Foreign Shipping.*

ESTABLISHED 1834.

No. ——

*No. 2, White Lion Court, Cornhill,*
*London,* 18

**These are to Certify,** That the ———————— of ————————
———————— Master, ———————— Tons, bound to ———————— has been Surveyed at
———————— by the Surveyors to this Society, and reported to be, on the ————————

and that she has been CLASSED and entered in the REGISTER BOOK of this Society with the Character

*Witness my hand,*

———————— *Secretary.* ———————— *Chairman.*

Charge

CIRCULAR No. 560.

## LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court, Cornhill, E.C.*
*September 26th*, 1885.

### FREEBOARD.

SIR,

I am directed to acquaint you that the Committee of this Society have adopted the amendments recommended in the Report of the Load-line Committee in the Tables for Freeboard hitherto issued by this Society.

I send to you some copies of the Tables thus adopted, bearing date 17th September, 1885, and I request you will be guided in accordance therewith in your future surveys for freeboard, and your reports thereon.

A further supply of the Tables will be sent to you on your applying for them.

I am, your obedient servant,
BERNARD WAYMOUTH,
*Secretary.*

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CIRCULAR No. 589.

## LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court, Cornhill, E.C.*
*18th February*, 1886.

### WEAR OF CHAIN CABLES.

SIR,

The question of deterioration of Chain Cables by wear has occupied the attention of the Committee; and I am directed to acquaint you that when a chain is found to be worn to an extent which in your opinion renders it inefficient, special care should be taken to examine all its parts, and if Chain Cables are found to be worn, ranging from two-sixteenths to four-sixteenths of an inch or above, according to their sizes, and the owners decline to renew the same, all the circumstances of the case should, without delay, be set forth for the information and determination of the Committee.

I am, sir, your obedient Servant,
B. WAYMOUTH,
*Secretary.*

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ESTABLISHED 1834.

No.———

*No. 2, White Lion Court, Cornhill,*
*London,* 188

**These are to Certify** That the ———— of ———— Tons, has been assigned by the Committee of Lloyd's Register of British and Foreign Shipping, a FREEBOARD as follows, viz. ———— in Salt Water† ———— in Fresh Water, and that this Freeboard has been marked on the vessel's sides, and recorded in the Society's Register Book in accordance with Notice No. 471* (as at foot).

*Witness my hand,*

———— *Secretary,* ———— *Chairman.*

Charge

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NOTICE NO. 572.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## FREEBOARD.

The Committee of this Society having at a meeting held this day adopted the amendments to the Tables of Freeboard agreed upon by the Load Line Committee and submitted to the Board of Trade, are prepared to assign Freeboards to all vessels whether classed in the Society's Register Book or not on the basis of the Amended Tables, provided the following conditions be complied with, viz. :—

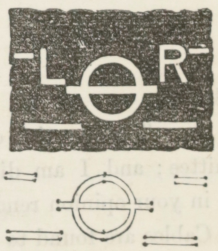
1.—The request shall be in writing.

2.—The Owner shall state in the form of request what in his opinion would be a suitable freeboard for the vessel.

3.—The vessel shall, if required, be surveyed in dry dock by one of the Society's Surveyors, who will report to the Committee before the Freeboard is determined.

4.—The minimum Freeboard in *salt* water determined by the Committee shall, if accepted by the owner, be adopted by him as that required by the Merchant Shipping Act of 1876 to be marked by a disc on the sides of the vessel. In the cases of Steam Vessels the disc shall be placed at the line for summer voyages, and the line for winter voyages indicated by marks painted below the summer line.

5.—The maximum draught in *fresh* water will also be indicated by the Committee, and is to be shown by marks painted above the load-line in *salt* water, as shown in the illustration to the following paragraph.




6.—The letters L R shall be painted on the sides of the vessel, one before and the other abaft the bar passing through the disc required by Act of Parliament as per sketch, and the position of the disc and bar shall in the case of Iron or Steel Vessels be further permanently shown by centre-punch marks, thus :—

*And*, in the case of Wood Ships, the horizontal bars shall be sunk for their breadths intothe planking, a depth of not less than one quarter of an inch.

The Freeboard (Summer and Winter in the cases of Steam Vessels) to the main deck, spar deck, or awning deck, as the case may be, will be recorded in the Society's Register Book.

2, WHITE LION COURT, CORNHILL, LONDON, E.C.
17*th September*, 1885.

By order of the Committee,
BERNARD WAYMOUTH, *Secretary.*

N.B.—The Freeboard assigned by the Committee is not to be considered suitable or sufficient if the vessel be engaged in the North Atlantic trade, sailing to or from the Mediterranean or any British or European port, or sailing from or calling at ports in British North America or eastern ports in the United States north of and including Baltimore, from October to March inclusive, but should be increased as provided for in the Tables of Freeboard. For Steam Vessels engaged in the Indian Seas, between the limits of Suez and Singapore, a reduction from the Summer Freeboard assigned is allowed during the fine season.

## No. 8—FORM OF ENGINEER-SURVEYOR'S REPORT ON MACHINERY.

No.—— No. in Reg. Book. Survey held at —— Date, first Survey —— Last Survey —— 18— (Number of Visits ——) on the —— Tons —— Master —— Built at —— By whom built —— When built —— Engines made at —— By whom made —— When made —— Boilers made at —— By whom made —— When made —— Registered Horse Power —— Owners —— Port belonging to ——

### ENGINES, &c.

Description of engines —— Diameter of cylinders —— Length of stroke —— No. of revolutions per minute —— Point of cut off, high pressure —— Low pressure —— Diameter of screw shaft —— Diameter of tunnel shaft —— Diameter of crank shaft journals —— Diameter of crank pin —— Size of crank webs —— Diameter of screw —— Pitch of screw —— No. of blades —— State whether movable —— Total surface —— No. of feed pumps —— Diameter of ditto —— Stroke —— Can one be overhauled while the other is at work —— No. of bilge pumps —— Diameter of ditto —— Stroke —— Can one be overhauled while the other is at work —— Where do they pump from —— No. of donkey engines —— Size of pumps —— Where do they pump from —— Are all the bilge suction pipes fitted with roses —— Are the roses always accessible —— Are the sluices on engine-room bulkheads always accessible —— No. of bilge injections —— and sizes —— Are they connected to condenser or to circulating pump —— How are the pumps worked —— Are all connections with the sea direct on the skin of the ship —— Are they valves or cocks —— Are they fixed sufficiently high on the ship's side to be seen without lifting the stokehold plates —— Are the discharge pipes above or below the deep water-line —— Are they each fitted with a discharge valve always accessible on the plating of the vessel —— Are the blow-off cocks fitted with a spigot and brass covering plate —— What pipes are carried through the bunkers —— How are they protected —— Are all pipes, cocks, valves, and pumps in connection with the machinery accessible at all times —— Are the pipes, cocks, and valves arranged so as to prevent an unintentional connection between the sea and the bilges —— When were stern tube, propeller, screw shaft, and all connections examined in dry dock —— Is the screw shaft tunnel watertight —— and fitted with a sluice door —— worked from ——

### BOILERS, &c.

Number of boilers —— Description —— Whether steel or iron —— Working pressure —— Tested by hydraulic pressure to —— Date of test —— Description of superheating apparatus or steam chest —— Can each boiler be worked separately —— Can the superheater be shut off and the boiler worked separately —— No. of square feet of fire grate surface in each boiler —— Description of safety valves —— No. to each boiler —— Area of each valve —— Are they fitted with easing gear —— No. of safety-valves to superheater —— Area of each valve ——Are they fitted with easing gear —— Smallest distance between boilers and bunkers or woodwork —— Diameter of boilers —— Length of boilers —— Description of riveting of shell, long. seams —— Circum. seams —— Thickness of shell plates —— Diameter of rivet holes —— Whether punched or drilled —— Pitch of rivets —— Lap of plating —— Percentage of strength of longitudinal joint —— Working pressure of shell by rules —— Size of manholes in shell —— Size of compensating rings —— No. of furnaces in each boiler —— Outside diameter —— Length, top —— bottom —— Thickness of plates —— Description of joint —— If rings are fitted —— Greatest length between rings —— Working pressure of furnace by the rules —— Combustion chamber plating, thickness, sides —— back —— top —— Pitch of stays to ditto, sides —— back —— top —— If stays are fitted with nuts or riveted heads —— Working pressure of

plating by rules —— Diameter of stays at smallest part —— Working pressure of ditto by rules —— End plates in steam space, thickness —— Pitch of stays to ditto —— How stays are secured —— Working pressure by rules —— Diameter of stays at smallest parts —— Working pressure by rules —— Front plates at bottom, thickness —— Back plates, thickness —— Greatest pitch of stays —— Working pressure by rules —— Diameter of tubes —— Pitch of tubes —— Thickness of tube plates, front —— back —— How stayed —— Pitch of stays —— Width of water spaces —— Diameter of superheater or steam-chest —— Length —— Thickness of plates —— Description of longitudinal joint —— Diameter of rivet holes —— Pitch of rivets —— Working pressure of shell by rules —— Diameter of flue —— Thickness of plates —— If stiffened with rings —— Distance between rings —— Working pressure by rules —— End plates of superheater or steam-chest, thickness —— How stayed —— Superheater or steam-chest, how connected to boiler ——

## DONKEY BOILER.

Description —— Made at —— By whom made —— When made —— Where fixed —— Working pressure —— Tested by hydraulic pressure to —— No. of certificate —— Fire grate area —— Description of safety valves —— No. of safety valves —— Area of each —— If fitted with easing gear —— If steam from main boilers can enter the donkey boiler —— Diameter of donkey boiler —— Length —— Description of riveting —— Thickness of shell plates —— Diameter of rivet holes —— Whether punched or drilled —— Pitch of rivets —— Lap of plating —— Percentage of strength of joint —— Thickness of crown plates —— Stayed by —— Diameter of furnace, top —— bottom —— Length of furnace —— Thickness of plates —— Description of joint —— Thickness of furnace crown plates —— Stayed by —— Working pressure of shell by rules —— Working pressure of furnace by rules —— Diameter of uptake —— Thickness of plates —— Thickness of water tubes ——

SPARE GEAR. State the articles supplied ——

The foregoing is a correct description,

——————————Manufacturer.

GENERAL REMARKS. State quality of workmanship, opinions as to class, &c. ——

The amount of Entry Fee .....£ : : received by me, } ————————
Special .....£ : : ———18— }
Donkey Boiler Fee .....£ : :
*To be sent as per Margin*) Certificate (if required) .....£ : :

*Engineer-Surveyor to Lloyd's Register of British and Foreign Shipping.*

*Travelling Expenses, if any,* £ ———
Committee's Minute ————

## Form No. 10.—FORM OF CERTIFICATE OF LLOYD'S M.C. FOR BOILERS AND ENGINES.

*Lloyd's Register of British and Foreign Shipping.*
ESTABLISHED 1834.

No. ——

*No. 2, White Lion Court, Cornhill,*

*London* 188

**These are to Certify,** That the Engines and Boilers of the ——— of ——— Master ——— Tons, have been surveyed at ——— by the Engineer-Surveyors to this Society, and reported to be on the ——— in good, efficient, and safe working condition, and that the Record LMC. (in red) ——— (Lloyd's Machinery Certificate), has been made in the Register Book accordingly.

*Witness my hand,*

——— *Secretary.* ——— *Chairman.*

Charge

## Form No. 11.—FORM OF CERTIFICATE OF B&MS. FOR BOILERS AND ENGINES.

*Lloyd's Register of British and Foreign Shipping.*
ESTABLISHED 1834.

No. ——

*No. 2, White Lion Court, Cornhill,*
*London,* 188

**These are to Certify,** That the Boilers and Machinery of the ——— of ——— Master ——— Tons, have been surveyed at ——— by the Engineer-Surveyors to this Society and reported to be on the ——— in good and efficient condition, and that the Record B&MS. (in red) ——— (Boilers and Machinery Surveyed), has been made in the Register Book accordingly.

——— *Secretary.*

Charge

*Witness my hand,* ——— *Chairman.*

## FORM OF CERTIFICATE OF THE CLASSIFICATION OF SHIPS IN THE LATE UNDERWRITERS' REGISTER OF IRON VESSELS.

*Lloyd's Register of British and Foreign Shipping,*
ESTABLISHED 1834.
*Amalgamated* 1885 *with the Underwriters' Registry of Iron Vessels,*
ESTABLISHED 1862.

No. ——

*No. 2, White Lion Court, Cornhill,*
*London,* 188

**This is to Certify** That the ———, of ———, ——— Master, ——— Tons, bound to ———, has been surveyed at ——— by the Surveyors to this Society, and reported to be on the ——— in a good and efficient state, and fit to carry dry and perishable Cargoes to and from all parts of the World, and that she has been continued as Classed and is entered in the Register Book of this Society with the Character subject to periodical Surveys.

*Witness my hand,*

——— *Secretary.* ——— *Chairman.*

Charge

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CIRCULAR No. 306. **AWNING-DECKED STEAMERS.**

It being a condition in the Rules of Lloyd's Register of British and Foreign Shipping that "*in Awning-decked vessels there must be scuppers and ports at the main deck through the side to discharge water*," and it having come to the knowledge of the Committee that in certain cases the scuppers and ports have been permanently closed, in contravention of the above Regulation, and the Committee having expunged the character assigned to a vessel which has been so dealt with :—

NOTICE IS HEREBY GIVEN to the owners of Awning-decked Vessels classed in Lloyd's Register Book, that in any cases brought to the knowledge of the Committee of the closing of the scuppers or the securing of the ports in such vessels, contrary to the Regulation in question, they will immediately suspend the Character assigned to them.

By order of the Committe,

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING, BERNARD WAYMOUTH, *Secretary.*

*No.* 2, *White Lion Court, Cornhill, London, E.C., 27th February*, 1873.

No. 314. **AWNING-DECKED VESSELS.**

NOTICE IS HEREBY GIVEN that, with reference to the Rule requiring that "*in Awning-decked vessels there must be scuppers and ports at the main deck through the side, to discharge water*," the Committee have passed the following Resolutions, viz. :

"In the case of the vessels *now* building, provided *every* frame be extended to the awning deck and a load-line submitted to the Committee be approved by them, ports and scuppers may be dispensed with."

"In all cases in which, in consequence of a *load-line* having been agreed upon as the ground for dispensing with ports and scuppers, should the vessel's draught in *salt water* exceed that indicated by the load-line, she shall cease to be entitled to a class in the Register Book, whilst so loaded ; and in all cases where a class has been assigned to a vessel having ports and scuppers, such class will be forfeited if the ports and scuppers be closed."

"The load-line so agreed to by the General Committee is to be inserted in the *Certificates* and in the *Register Book*."

"Awning-decked Ships which have *already* been allowed to have ports and scuppers closed, are to have their load-line inserted in their Certificates of Classification, and recorded in the Register Book."

By order of the Committee,

*No.* 2, *White Lion Court, Cornhill, London, E.C., 21st August*, 1873. BERNARD WAYMOUTH, *Secretary,*

CIRCULAR No. 340. **AWNING-DECKED STEAMERS.**

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

*No.* 2, *White Lion Court, Cornhill, London, E.C., 8th December*, 1875.

..... .....

With reference to the Notices, numbered 305 and 314, issued by the Committee of this Society in February, and August, 1873, calling attention to the conditions under which Awning-decked Vessels are classed in the Register Book, I am directed in forwarding to you copies of those notices, to acquaint you that the Committee, having become aware that the condition on classification, that the Ports and Scuppers at the main deck must remain open for the discharge of water, continues to be contravened, have resolved, that in *all* cases, of Awning-decked Vessels classed in the Register Book, a load-line shall be determined on for them, to be marked on the Ship's side, and recorded in the Register Book and on the Certificate of Classification.

Under these circumstances, I am to request you will submit to me for the Committee's consideration the load-line you suggest for adoption in the case of your Iron Screw Steamer.....

I have to add, that in every instance of non-compliance with this requirement within six months of the date hereof, the character of the vessel will be expunged from the Register Book. I am,.....

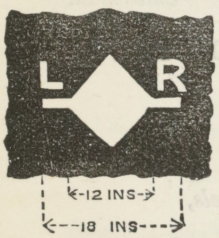
Your obedient Servant,

(*Signed*) B. WAYMOUTH, *Secretary.*

CIRCULAR No. 354. **AWNING-DECKED STEAMERS.**

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

*No.* 2, *White Lion Court, Cornhill, London.*




*To be White or Yellow on a dark ground, or Black on a light ground.*

..... .....

With reference to the Circular Letter, numbered 340, issued by the Committee of this Society in December, 1875, conveying their Resolution, that in all cases of Awning-decked Vessels classed in the Register Book, a load-line shall be determined on for them, to be marked on the ship's side, and recorded in the Register Book and on the Certificate of Classification, I am to acquaint you that the Committee having understood that the above requirement as to the marking of the load-line on the ship's side, has not in all cases been complied with, they hereby call attention thereto ; and I am to add that the mark decided upon by the Committee, to be painted on each side of the ship as nearly amidships as practicable, shall be a diamond with a bar at each end, having the letter **L** above the left bar and the letter **R** above the right bar, as herein illustrated.

The centre of the bar to be the load-line. I am,.....

Your obedient Servant,

B. WAYMOUTH, *Secretary.*

CIRCULAR No. 369. **AWNING-DECKED STEAMERS.**

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

*No.* 2, *White Lion Court, Cornhill, London, E.C., 4th January*, 1877.

I beg to refer you to my letter of the 8th December, 1875, with its enclosures (and of which I now transmit copies), acquainting you with the Committee's determination to expunge from the Register Book the Character assigned therein to the Awning-decked Screw Steamer.....unless a load-line be approved by the Committee for this vessel, and be marked on the ship's side, and recorded in the Register Book and on the Certificate of her Classification, and I am to add, that in the absence of a reply thereto the Committee feel it to be out of their power to continue the character of the vessel in the Register Book, and that, unless a satisfactory reply be received prior to the reprinting of the book in April next, the vessel's character will be expunged therefrom by a red line.

I at the same time enclose a circular letter, Numbered 354, showing the form of mark decided on by the Committee for the ship's side. I am,.....

Your obedient Servant,

B. WAYMOUTH, *Secretary.*

[*See also Circulars on next page*

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## FREEBOARD.

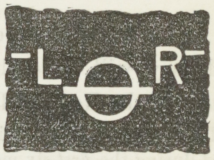
### AWNING-DECKED STEAM VESSELS.

With reference to Notice No. 572, on the Freeboard of Vessels,

NOTICE is hereby given that, in regard to awning-decked vessels already classed in the Society's Register Book, the Owners of such vessels will be allowed the option either of retaining the mark prescribed in Circular No. 354 for indicating the load-line of awning-decked vessels, or of having their vessels marked in accordance with the conditions of the following paragraphs, numbered 1, 2 and 3.

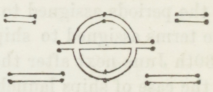
In respect to awning-decked vessels built in future, the marking as prescribed in Circular No. 354 will be discontinued, and to entitle vessels of this description to classification in the Society's Register Book, the following conditions shall be complied with, in addition to the requirements set forth in Section 43 of the Society's Rules for Iron Vessels, viz. :—

1.—The minimum freeboard in *salt* water determined by the Committee shall be adopted by the Owner as the load-line required by the Merchant Shipping Act of 1876 to be marked by a disc on the sides of the vessel. The disc shall be placed at the line for summer voyages, and the line for winter voyages indicated by marks placed below the summer line.




2.—The maximum draught in *fresh* water will also be indicated by the Committee, and is to be shown by marks painted above the maximum load-line in *salt* water, as shown in the illustration to the following paragraph.

3.—The letters **L R** shall be painted on the sides of the vessel, one before and the other abaft the bar passing through the disc required by Act of Parliament, as per sketch, and the position of the disc and bar shall be further permanently shown by centre-punch marks, thus :—



The Freeboard to the awning-deck (summer and winter) will be recorded in the Society's Register Book.

By order of the Committee,
BERNARD WAYMOUTH
*Secretary.*

*No. 2, White Lion Court, Cornhill, London, E.C.*
*17th September*, 1885.

N.B.—It is a condition on which an awning-decked vessel is classed in the Society's Register Book that the Freeboard assigned shall be marked on the vessel's sides as above prescribed; and, under the provisions of Section 43 of the Society's Rules for Iron Ships, if the vessel be loaded to a greater draught of water than that assigned by the Committee, or if the mark indicating the maximum load draught be placed higher than the position assigned by the Committee, the vessel will thereby forfeit her Character in the Register Book.

No. 564.

## LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

### EXPIRATION OF CHARACTER OF SHIPS CLASSED A, A IN RED, Æ AND E.

NOTICE IS HEREBY GIVEN, that in pursuance of the Rules, Section 59 (as set forth below) and of a Resolution passed this day by the Committee of Lloyd's Register of British and Foreign Shipping:—

"All Ships classed A for a term of years, will, at the expiration of such term (or so soon after as may be practicable) have the word '*expired*' inserted against their names in the Register Book, and, if not surveyed and re-classed prior to the reprinting of the Register Book for issue in July next, will appear therein without character."

The foregoing Resolution will likewise apply to Ships classed A in Red, Æ and E, whose period of exemption from special re-survey will terminate on the 31st December.

By order of the Committee,

BERNARD WAYMOUTH,

*No. 2, White Lion Court, Cornhill, London, E.C.* *Secretary.*

*15th October*, 1885.

### EXTRACT FROM THE RULES, SECTION 59.

"At the termination of the several periods assigned to Ships for remaining on the Character A, or A in Red, they will have the word '*expired*' inserted against them; and if not surveyed prior to the reprinting of the Register Book, they will appear without any character."*

* The terms of years assigned to ships on the Character A, launched *previously to the 1st July*, 1859, also of ships launched during the *first* six months of the years 1860, 1861, 1862, and 1863, will expire on the 31st December of the last year of the periods assigned to them respectively.

The terms assigned to ships launched during the *last* six months of the years 1859, 1860, 1861, and 1862, will expire on the 30th June next after the last year of the periods assigned to them respectively.

In the case of ships launched on and after the 1st July, 1863, the period originally assigned to them on the A Character, will in every case *date from the month* in which the vessel may be launched, and will expire at the end of the corresponding month in the year at which the period assigned terminates.

No. 565.

### SHIPS CLASSED A IN RED, Æ, OR E.

The Rules, Sections 60, 61 and 62, requiring that Ships classed A in Red, Æ or E, shall be surveyed *annually*, or on their return from every Foreign voyage.

NOTICE IS HEREBY GIVEN, that in accordance with the above Rules, and in pursuance of a Resolution passed this day by the Committee, the Characters of Ships classed A in Red, Æ or E, which shall not have been surveyed since the year 1883, will be omitted in reprinting the Register Book for issue in July, 1886.

By order of the Committee,

BERNARD WAYMOUTH,

*No. 2, White Lion Court, Cornhill, London, E.C.* *Secretary.*

*15th October*, 1885.

N.B.—In the case of Ships which it shall be made to appear, by letter addressed to the Secretary, have not been in any Port in the United Kingdom since 1883, the above Resolution will not be applied.

No. 419 (*in part*).

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## RULES FOR BOILERS, &c.

### RULES FOR DETERMINING THE WORKING PRESSURE TO BE ALLOWED IN NEW BOILERS.

#### CYLINDRICAL SHELLS.

The strength of circular shells to be calculated from the strength of the longitudinal joints by the following formula:—

$$\frac{C \times T \times B}{D} = \text{working pressure.}$$

where C = co-efficient as per following table.
T = thickness of plate in inches.
D = mean diameter of shell in inches.
B = percentage of strength of joint found as follows—the least percentage to be taken.

For plate at joint $B = \frac{p - d}{p} \times 100.$

For rivets at joint $B = \frac{n \times a}{p \times T} \times 100$ with iron rivets in iron plates with punched holes.

$$B = \frac{n \times a}{p \times T} \times 90 \text{ with iron rivets in iron plates with drilled holes}$$

$$B = \frac{n \times a}{p \times T} \times 85 \text{ with steel rivets in steel plates.}$$

$$B = \frac{n \times a}{p \times T} \times 70 \text{ with iron rivets in steel plates.}$$

(In case of rivets being in double shear, $1{\cdot}75a$ is to be used instead of $a$.)

where p = pitch of rivets.
d = diameter of rivets.
a = sectional area of rivets.
n = number of rows of rivets.

MEM.—In any case where the strength of the longitudinal joint is satisfactorily shown by experiment to be greater that given by this formula, the actual strength may be taken in the calculation.

No. 419 (*continued*).

## TABLE OF CO-EFFICIENTS.

IRON BOILERS.

| Description of Longitudinal Joint. | For Plates $\frac{1}{2}$-inch thick and under. | For Plates $\frac{5}{8}$-thick and above $\frac{1}{2}$-inch. | For Plates above $\frac{5}{8}$-inch thick. | |
|---|---|---|---|---|
| Lap Joint, Punched Holes | 155 | 165 | 170 | |
| Lap Joint, Drilled Holes | 170 | 180 | 190 | |
| Double Butt Strap Joint, Punched Holes | 170 | 180 | 190 | |
| Double Butt Strap Joint, Drilled Holes | 180 | 190 | 200 | |

STEEL BOILERS.

| Description of Longitudinal Joint. | For Plates $\frac{3}{8}$-thick and under. | For Plates $\frac{9}{16}$ thick and above $\frac{3}{8}$. | For Plates $\frac{3}{4}$-thick and above $\frac{9}{16}$. | For Plates above $\frac{3}{4}$-thick. |
|---|---|---|---|---|
| Lap Joints | 200 | 215 | 230 | 240 |
| Double Butt Strap Joints | 215 | 230 | 250 | 260 |

Note.—The inside butt strap to be at least $\frac{3}{4}$ the thickness of the plate.

Note.—For the shell plates of superheaters or steam chests enclosed in the uptakes or exposed to the direct action of the flame, the co-efficients should be $\frac{2}{3}$ of those given in the above tables.

Proper deductions are to be made for openings in shell.

All manholes in circular shells to be stiffened with compensating rings.

The shell plates under domes in boilers so fitted, to be stayed from the top of the dome or otherwise stiffened.

## STAYS.

The strength of stays supporting flat surfaces is to be calculated from the weakest part of the stay or fastening, and the strain upon them is not to exceed the following limits, namely :—

**Iron Stays.**—For screw stays, and for other stays not exceeding $1\frac{1}{2}$ inches effective diameter, and for all stays which are welded, 6,000 lb. per square inch; for unwelded stays above $1\frac{1}{2}$ inches effective diameter, 7,500 lb. per square inch.

**Steel Stays.**—For screw stays, and for other stays not exceeding $1\frac{1}{2}$ inches effective diameter, 8,000 lb. per square inch; for stays above $1\frac{1}{2}$ inches effective diameter, 9,000 lb. per square inch. No steel stays are to be welded.

No. 419 (*continued*).

## FLAT PLATES.

The strength of flat plates supported by stays to be taken from the following formula :—

$$\frac{C \times T^2}{P^2} = \text{working presure in lb. per square inch.}$$

where $T$ = thickness of plate in sixteenths of an inch.

$P$ = greatest pitch in inches.

$C$ = 90 for plates $\frac{7}{16}$ thick and under fitted with screw stays with riveted heads.

$C$ = 100 for plates above $\frac{7}{16}$ fitted with screw stays with riveted heads.

$C$ = 110 for plates $\frac{7}{16}$ thick and under fitted with screw stays and nuts.

$C$ = 120 for plates above $\frac{7}{16}$ fitted with screw stays and nuts.

$C$ = 140 for plates fitted with stays with double nuts.

$C$ = 160 for plates fitted with stays with double nuts, and washers at least $\frac{1}{2}$ thickness of plates and a diameter of $\frac{2}{5}$ of the pitch, riveted to the plates.

NOTE.—In the case of front plates of boilers in the steam space, these numbers should be reduced 20 per cent., unless the plates are guarded from the direct action of the heat.

## GIRDERS.

The strength of girders supporting the tops of combustion chambers and other flat surfaces to be taken from the following formula :—

$$\frac{C \times d^2 \times T}{(L-P) \times D \times L} = \text{working pressure in lb. per square inch.}$$

where $L$ = length of girder.

$P$ = pitch of stays.

$D$ = distance apart of girders.

$d$ = depth of girder at centre.

$T$ = thickness of girder at centre. All these dimensions to be taken in inches.

$$C = \begin{cases} 6{,}000, \text{ if there is one stay to each girder.} \\ 9{,}000, \text{ if there are two or three stays to each girder.} \\ 10{,}200, \text{ if there are four stays to each girder.} \end{cases}$$

## CIRCULAR FURNACES.

The strength of plain furnaces to resist collapsing to be calculated from the following formula :—

$$\frac{89{,}600 \times T^2}{L \times D} = \text{working pressure in lb. per square inch.}$$

where 89,600 = constant.

$T$ = thickness of plates in inches.

$D$ = outside diameter of furnace in inches.

$L$ = length of furnace in feet. If rings are fitted, the length between rings to be taken.

The pressure in no case to exceed $\frac{8{,}000 \times T}{D}$

No. 419 (*continued*).

The strength of the corrugated furnaces (corrugations $1\frac{1}{2}$ inches deep) to be calculated from the following formula :—

$$\frac{1000 \times (T-2)}{D} = \text{working pressure in lb. per square inch,}$$

where $T$ = thickness of plates in sixteenths of an inch,
$D$ = greatest diameter of furnace in inches.

## DONKEY BOILERS.

The iron used in the construction of the fire boxes, uptakes, and water tubes of donkey boilers shall be of good quality, and to the satisfaction of the Surveyors, who may in any cases where they deem it advisable apply the following tests :—

| Thickness of Plates. | To Bend cold through an angle of | |
|---|---|---|
| | With the Grain. | Across the Grain. |
| $\frac{5}{16}$ | 80° | 45° |
| $\frac{6}{16}$ | 70° | 35° |
| $\frac{7}{16}$ | 55° | 25° |
| $\frac{8}{16}$ | 40° | 20° |

The material to stand bending *hot* to an angle of 90 degrees, over a radius not greater than $1\frac{1}{2}$ times the thickness of the plates.

By Order of the Committee,

BERNARD WAYMOUTH,
*Secretary.*

*No.* 2, *White Lion Court, Cornhill, London, E.C.*
*7th June*, 1883.

No. 432.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## ANCHORS AND CABLES.

### STEEL WIRE CABLES.

TABLE No. 22.

NOTICE.

NOTICE IS HEREBY GIVEN, that the Committee are prepared to sanction the supply of one flexible steel wire cable in steam vessels for which classification in the Society's Register Book is contemplated, in the place of one of the chain cables, provided the following conditions be complied with, namely:—

That the size of, and the proposed tests for, the steel wire cable be in the first place submitted to the Committee and receive their approval.

That the mode of attaching the steel wire cable to the anchor, the proposed weight and shape of the anchors intended to be used, and the nature of the proposed appliances for working the steel wire cables to be in the first instance submitted for the consideration and approval of the Committee, and that in the case of a steel wire cable being supplied, a notation be made after the name of the vessel of *steel wire cable exp'l.*

Table No. 22 has also been amended in the columns for stream chains, towlines, hawsers, and warps. See also the foot-note thereto.

By Order of the Committee,

BERNARD WAYMOUTH, *Secretary.*

*No. 2, White Lion Court, Cornhill, London, E.C.*
*3rd June*, 1880.

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No. 437.

*No. 2, White Lion Court, Cornhill, London, E.C.*
*12th August*, 1880.

### HAWSERS AND WARPS.

SIR,

With reference to the foot-note added, as per Notice, No. 432, dated 3rd June, 1880, to Table No. 22, to the effect that "Where a departure from the requirements of the Table for hawsers and warps is proposed, the same should be in all cases submitted in the first place for the approval of the Committee," I am directed to acquaint you that in the case of vessels built after the above date, the Committee will require an adherence to the equipment prescribed in the Table, unless their sanction for a departure therefrom has been previously obtained; and I am to request you will, in the event of your becoming aware of proposed departures from the Rules, lose no time in apprising the builders of the vessel of the above conditions.

I am to add, that in any case it is the duty of the Surveyor to draw the Committee's attention, either by letter or on his report on the vessel, to any departures from the Rules, with such remarks as he may have to offer thereon.

I am, Sir,

Your obedient Servant,

BERNARD WAYMOUTH, *Secretary.*

*The Surveyor,*
*Lloyd's Register of Shipping.*

No. 488.

## LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

### LARGE FORGINGS.

With reference to Notice No. 453, of the 8th December, 1881, on the subject of the inspection of large forgings, intended to be used in the construction of ships or engines proposed to be built under the survey of the Surveyors to this Society, the Committee have recently had under consideration some cases in which, owing to the omission of the Shipbuilders and Engineers to give early intimation to the local Surveyors of the intended manufacture of the forgings, the requisite inspection at the works could not be made by the Society's officers.

The Committee, therefore, think it right, in order to obviate any inconvenience in future, to suggest that in all cases Shipbuilders and Engineers should furnish the local Surveyors with all necessary information *when the orders for such forgings are issued.*

By Order of the Committee,

B. WAYMOUTH,

*Secretary*

*No. 2, White Lion Court, Cornhill, London, E.C.*
*25th January*, 1883.

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Circular No. 516.

## LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court, Cornhill, E.C.*
31*st October*, 1883.

Sir,

### INSPECTION OF FORGINGS.

With reference to Circulars numbered respectively 454 and 480 on the subject of the inspection of forgings, intended to be used in the construction of ships or machinery being built under the survey of this Society's Surveyors, I am directed to request your attention to the following points:—

1. With the view of lessening the delays which occasionally occur in the transmission of the requisite information, and for the convenience of Shipbuilders and Engineers, forms have been prepared for their use in supplying the particulars of forgings ordered by them; and these forms, immediately upon receipt, are to be forwarded by the local Surveyors directly to the officer who will attend to the inspection of the forgings. Although the filling up of the forms will therefore, in future, devolve upon the Shipbuilders and Engineers, it will be the duty of the Surveyors to see that the information is furnished in due course.

2. When the forgings have been inspected, a report should in each case be made out by the inspecting Officer, and, if in all respects satisfactory, should be sent without delay to the Surveyors under whose survey the forgings will be used; and this report should be attached to the report on the vessel or machinery, as the case may be, upon the completion of the same. If the result of the inspection is not

quite satisfactory, or if no opportunity has been afforded of making the necessary examination, the case must be specially reported to the Committee.

3. As regards Engine forgings, it is considered that the most suitable time for the inspection of shafting is during the operation of rough-turning, and when the shafts are finished. In all cases where the shafts are rough-turned at the forges, the inspection should be made by the Officer whose duty it is to attend there; but when this operation is conducted at the Engineer's works, the shafting should be examined there by the local Engineer Surveyor under whose inspection the machinery is being constructed, who should make a note to that effect on his report.

4. While the Society's Officers attending forges will thus be relieved of the necessity of inspecting each individual Engine forging while being forged, it is the Committee's wish that they should still keep themselves accurately informed of the practices adopted in the various forges visited, and in the event of objectionable methods of construction coming under notice, the attention of the maker should be drawn thereto, and if this does not effect a satisfactory alteration the case should be fully reported to the Committee.

5. For your information and guidance, I may mention that all forgings (other than Engine forgings which are to be rough-turned at the Engineering works) made on the North-East Coast, should be inspected by Mr. Cameron, the Society's Inspector of Forgings at Sunderland; those made in the districts of Glasgow and Greenock by Mr. Newcomb, the corresponding Officer stationed at the former port; and those manufactured in the districts of Liverpool, Hull, Leith, or Dundee, by the respective local Surveyors as hitherto. All intimations concerning forgings to be made in London or in the Midland Counties should be addressed to this office.

6. I have sent to you a supply of the notice forms referred to, which you will be good enough to place in the hands of Shipbuilders and Engineers in your district as may be necessary; and also some copies of amended forms of Reports on forgings for use in future.

I am, Sir,

Your obedient Servant,

B. WAYMOUTH,

*Secretary.*

*P.S.—In all cases where steel castings are proposed to be used in lieu of forgings, the preliminary form of particulars as well as the report of the examination and tests should be forwarded to the Committee in the first instance.*

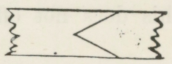
No. 583

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

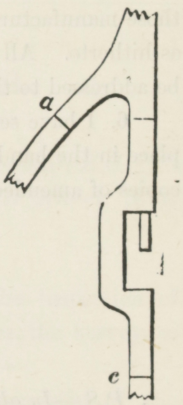
2, *White Lion Court, Cornhill, London, E.C.*
*January 19th*, 1886.

## WELDING OF LARGE FORGINGS.

SIR,

The Committee having had under their consideration the subject of the manufacture of Large Forgings for shipbuilding purposes, I am directed to state that from experiments which have been made it has been found that to ensure sound welds in heavy forgings steam hammers should be employed instead of the sledge hammers formerly used; and the welds when of  form should have the V angle not less than 60°. The old plan of screwing the parts together at a welding heat is not found to be satisfactory, especially in forgings of considerable sectional area, and in view of this, in future the welding of forgings exceeding forty square inches in sectional area will be required by the Committee to be done with steam hammers.

It has been the practice in some works to place the "shut" of the lower part of a stern frame in the sole piece. This is considered to be very objectionable; and the Surveyor should inform manufacturers that the welding should be placed in the lower part of the posts in all cases, and that such connections in the sole piece will not be sanctioned. In Rudder frames the welds of the upper part of the frame to the main piece should not be placed close together as indicated in the sketch at *a, b*; but should be arranged so as to be well clear of each other as indicated by *a, c*.




In cases where stern frames or rudders are taken out of vessels to be repaired, the Surveyors should furnish full particulars of the defects observed, including a sketch showing the position and nature of the fracture on the Report, for the information of the Committee, so that a record might be kept in this office of all failures in such forgings.

I am, Sir, your obedient servant,

B. WAYMOUTH,
*Secretary.*

CIRCULAR No. 536.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## CAST STEEL MAST CAPS.

SIR,

In reference to the use of cast steel mast caps, I am directed to inform you that the Committee of this Society will be prepared to admit of such steel mast caps being fitted to vessels intended to be classed in the Register Book on the following conditions:—

It is requisite that builders proposing to use cast steel mast caps shall, in the first instance, state the name of the firm by whom the caps are to be made, in order that the Committee may be satisfied that the manufacturers have proper facilities for making steel caps of a satisfactory quality.

With this object, the manufacturers will be required to give notice to the Committee when an opportunity can be afforded to the Society's surveyors to attend at the works, in order to report upon the appliances in use and the processes of manufacture, and also to ascertain by crucial tests that the material of which the caps are proposed to be made is of good and ductile quality.

Upon a favourable report being received from the Surveyors, after the inspection of the works of a manufacturer, the Committee will sanction the use of caps of his manufacture, provided test pieces be cast on the caps of sufficient size, to enable the Surveyors to subject the same to such tests as they may deem necessary, in order to satisfy themselves that the material is of good quality. The caps also are to be suspended and severely hammered in the presence of the Surveyors to ensure that the casting is sound in each case.

I am, your obedient servant,

B. WAYMOUTH, *Secretary.*

2, *White Lion Court, Cornhill, E.C.,*
*6th November*, 1884.

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CIRCULAR No. 594.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

2, *White Lion Court, Cornhill, London, E.C.*
*27th April*, 1886.

## QUALITY OF IRON.

SIR,

The Committee's notice having been drawn to the subject of the extremely low price of Iron at the present time, and to the consequent possibility of some of the Iron now manufactured being of inferior quality, I am directed to request your special attention to the circular letter (No. 498), which was issued to the Society's Surveyors on the 31st May, 1883, in reference to the quality of iron for shipbuilding, and to impress on you the importance of a close observance of the instructions contained therein.

The Committee, with special regard to existing circumstances, will be glad to be furnished with any remarks you have to offer on the quality of iron now supplied for shipbuilding.

I am, Sir, your obedient servant,

B. WAYMOUTH, *Secretary.*

NOTICE.—No. 576.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## ALTERATIONS AND AMENDMENTS MADE IN THE RULES OF THE SOCIETY BY THE GENERAL COMMITTEE.

Alterations and additions have been made as follows in the Rules for the Building and Classification of Ships, viz. :—

### ALTERATIONS MADE IN TABLE No. 22 FOR EQUIPMENT.

The footnote (*a*) to Table No. 22, as regards the equipment of Steam Vessels, has been altered so as to read as follows, viz. :—

By section 39 of the Rules for the building and classification of Iron and Steel Ships, it is provided that the equipment is to be regulated by the number produced by the sum of the measurements of the half-moulded breadth of the vessel amidships, the depth from the upper part of keel to the top of the upper deck beams, and the girth of the half midship section to the same height, multiplied by the length, for a one, two, and three decked vessel, and for a spar-decked vessel.

For a vessel having a complete awning deck or a continuous shade deck, the equipment number is to be increased one-eighth beyond what it would be if the vessel were flush decked.

For a vessel with a partial awning deck, poop, top-gallant forecastle, bridge house, or a raised quarter-deck, the equipment number is to be increased beyond that for a flush, or spar, deck vessel by that proportion of the addition made for a complete awning deck which the combined length of the erections bears to the length of the vessel.

## BOILERS OF STEAM SHIPS.

### STEEL FOR BOILER PLATES.

On reference to the Rules, it will be observed that by the terms of the first sentence of the first paragraph on page 52 of the Rules, Steel for boilers is required to have an ultimate strength of not less than 26 and not more than 30 tons per square inch of section with an ultimate elongation of not less than 20 per cent. in a length of 8 inches.

This sentence has been substituted by the following clauses, viz. :—

The material of stays and of plates not exceeding 1 inch in thickness is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section.

In plates above 1 inch and not more than $1\frac{3}{8}$ inch in thickness the ultimate strength must not be less than 26 and not more than 29 tons per square inch, and in plates above $1\frac{3}{8}$ inch in thickness the ultimate strength must not be less than 26 tons and not more than 28 tons per square inch.'

In all cases the ultimate elongation must not be less than 20 per cent. in a length of 8 inches.

The last sentence of paragraph 3, which now reads as follows,—

"In addition to these tests the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers."

has been altered to read as follows, viz. :—

In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the construction of boilers.

By order of the Committee,

BERNARD WAYMOUTH,

*Secretary.*

2, *White Lion Court, Cornhill, London, E.C.*
10*th December*, 1885.

NOTICE.—No. 597.

# LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

## ALTERATIONS AND AMENDMENTS MADE IN THE RULES OF THE SOCIETY BY THE GENERAL COMMITTEE.

Alterations and additions have been made as follows in the Rules for the Building and Classification of Ships, viz. :—

### RULES FOR PERIODICAL SURVEYS OF IRON VESSELS.

The following to be included in Paragraph 1 of Survey No. 3, pages 18 and 71 of the Rules for Iron Vessels :—

To follow in ast line after—"and inner surface of the plating to be exposed"—"and where side lights are fitted, the condition of the plating in way of the same to be ascertained."

The following words to be inserted in the Sections relating to the Special Surveys Nos. 1, 2, and 3, prescribed in the Rules for Iron Ships :—

Where deep water ballast tanks are fitted, their watertightness should be tested by a head of water not less than eight feet above the crown of the tank.

By order of the Committee,

BERNARD WAYMOUTH,

*Secretary*

*2, White Lion Court, Cornhill, London, E.C.*
*3rd June*, 1886.

# KEY TO THE REGISTER.

1886—87.

# KEY TO SYMBOLS OF CLASSIFICATION IN REGISTER BOOK.

## CLASSIFICATION OF LLOYD'S REGISTER.

*⊕1 ..... Character of Iron vessels built with thicker plating than the Rules *now* require.

⊕1 ⊕1 ⊕1 Characters of Iron ships built according to the Rules of the Society in force between the years 1864 and 1871.

A1 ..... Without a numeral prefixed, character of Iron vessels built for a special purpose.

100A1 95A1
90A1 85A1
80A1 75A1
} Characters of ships built of Iron or Steel according to the Rules of the Society for Iron ships since 1869.

A 1 ..... Character of Wood or Composite ships of the first class well and sufficiently equipped. The figures in column 13 indicate the term of years assigned originally or on continuation on the character A.

A 1 ..... Character of ships which have passed period assigned on original Survey, or Continuation, or Restoration, and of ships, not having an original Character, which are found to be fit to carry dry and perishable goods to and from all parts of the world.

Æ 1 ..... Character of ships fit for conveyance of dry and perishable goods on short voyages, and cargoes not in their nature subject to sea damage on any voyage.

E 1 ..... Character of ships which have been found on survey fit for the conveyance of cargoes not in their nature subject to sea damage on any voyage.

1 F 2 F ..... ..... Characters assigned to Foreign Built Ships—now discontinued.

The figure 1 affixed to a character signifies that the vessel is well and sufficiently equipped. A line after the A (thus, A—) signifies that the equipment is deficient from that required by the Rules.

A ring over the figure 1, thus Φ, indicates defects in the masts or rigging of a Sailing ship imperilling the vessel's safety.

A *red* ring over the figure 1, thus ① indicates defects in the engines and boilers of a steam ship imperilling the vessel's safety.

## CLASSIFICATION OF THE UNDERWRITERS' REGISTRY.

A1*, A1* ..... Characters of Iron or Steel Vessels built in excess of the Rules and of extra quality of Iron.

A1*, A1*; A1, A1; A, A Characters of Iron, Steel, or Composite Vessels built according to the Rules.

Vessels classed in Red have been built under the inspection of the Surveyors to the Liverpool Registry.

The symbols of class when printed within brackets thus (A1*)—, indicate that the class of the Vessel has lapsed for want of Survey, and when printed within brackets thus (A1*) (—), that the class has been withdrawn by request of the owners.

The figure 1 or 2 affixed to Symbols of Classification signifies the Character of Equipment.

The figures in the fifteenth Column represent the mean drafts corresponding to an immersion of 65, 70, 75, and 80 per cent. respectively, as assigned by the Underwriters' Registry, but these drafts do not indicate approved load lines.

## ABBREVIATIONS (*Alphabetically arranged*), AND SIGNS.

| Abbreviation or Sign. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| | | A. |
| *a*, or *a*† | 13 | Equipment letter, as per Table No. 22. |
| (*a*) ..... | 7 | Shell, end plates, furnaces and combustion chamber of boiler made of steel; stays of iron. |
| *A.* ..... | 7 | Ash (timber). |
| A.&C.P. ... | 12 | Anchors and Chains proved at a Public Machine recognised by the Committee of LLOYD'S REGISTER. See Table No. 22. |
| Alm. rb. | 7 | Almost rebuilt,—with date of the work. |
| A.P. ..... | 12 | Anchors proved at a Machine recognised by the Committee of LLOYD'S REGISTER. See Table No. 22. |
| *A.P.T.* ... | 10 | After Peak Tank. See Illustration following KEY to REGISTER. |
| Asp. ..... | 2 | Asphalted. |
| *Awning dk.* | 5 | Built according to the Rules for Awning Decked vessels. Section 43. |
| | | B. |
| *b*, or *b*† ... | 13 | Equipment letter, as per Table No. 22. |
| (*b*) ..... | 7 | Shell, stays and end plates of boiler made of iron; furnaces and combustion chamber of steel. |
| *B.B.* ..... | 7 | Black Birch (timber). |
| *Bh.* ..... | 7 | Beech (timber). |
| *B.D.* ..... | 5 | Bridge Deck. |
| *B.Hds.* ... | 2 | Bulkheads, with number of same prefixed. |

*A List of Surveying Ports will be found at the end of the* KEY TO REGISTER.

# KEY TO SYMBOLS AND ABBREVIATIONS—*continued.*

| Abbreviation or Sign. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| B&MS. | 7 | Boilers and Machinery Surveyed, with date, denoting that the Boilers and Machinery, though not fitted strictly in accordance with the Rules, were found, upon inspection at that time, to be in good condition. |
| BS | 7 | Boilers Surveyed, with date, denoting that the Boilers were found, upon inspection at that time, to be in good condition. |
| B.S. ..... | 10 | Subject to Biennial Survey. |
| Bk. ..... | 2 | Bark (Barque). |
| Bkn. ..... | 2 | Barkentine (Barquentine). |
| Bg. ..... | 2 | Brig. |
| Bn. ..... | 2 | Brigantine. |
| *Brk.* ..... | 5 | Break Deck. |
| | | C. |
| *c*, or *c*† ... | 13 | Equipment letter, as per Table No. 22. |
| (*c*) ..... ... | 7 | Shell and stays of boiler made of iron ; end plates, furnaces and combustion chamber of steel. |
| C ..... | 2 | Sheathed with Copper. |
| *Cr.* ..... | 7 | Cedar (timber). |
| *Chs.* .. ... | 7 | Chestnut (timber). |
| C. ..... | 7 | Compound Engines. |
| C. ..... | 13 | Placed before figures signifies the number of years for which the Vessel had been Continued. |
| C.B. ..... | 2 | Fastened with Copper or Yellow Metal Bolts, as per paragraph No. 3, Section 46 of Rules for Wood Ships. |
| c.f. ..... | 2 | Fastened with Copper or Yellow Metal bolts, as per paragraph No. 1 in Section 46 of Rules for Wood Ships. |
| C.F. ..... | 2 | Fastened with Copper or Yellow Metal bolts, as per paragraph No. 2 in Section 46 of Rules for Wood Ships. Also for Copper or Yellow Metal fastenings of Composite ships, as per paragraph No. 1, page 129. |
| **C.F.** ... | 2 | Fastened with Copper or Yellow Metal bolts for Composite ships, as per paragraph No. 2, page 129. |
| c.p. ..... | 12 | Chains proved at a Public Machine recognised by the Committee of LLOYD'S REGISTER. See Table No. 22. |
| *Cell. DB.* | 10 | Cellular construction of Double Bottom. See Illustration following KEY to REGISTER. |
| Cem. ..... | 2 | Cemented. |
| Cl. ..... | 7 | Clincher (build). |
| *Cmp.* .. ... | 7 | Engines altered to Compound, with date thereof. |
| Comp. | 2 | Composite (build). |
| Cont. ..... | 10<br>11<br>12<br>13 | Continued. With the name of Port of Survey and Date, also number of years for which the vessels are Continued on the Character A (thus, Cont. Lon. Dec. 83–8years). |
| Ctr. .. ... | 2 | Cutter. |
| Cy. ..... | 7 | Cylinders, with number of same prefixed. The figures after Cy. represent diameter of cylinders and length of stroke in inches. |

| Abbreviation or Sign. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| | | D. |
| *d*, or *d*†... | 13 | Equipment letter, as per Table No. 22. |
| (*d*) ..... | 7 | Shell and end plates of boiler made of steel ; stays, furnaces, and combustion chamber of iron. |
| d. ..... | 2 | Doubled with Wood. |
| D. ..... | 7 | Diagonal Engines. |
| *D.B.* ..... | 10 | Double Bottom. See Illustration following KEY to REGISTER. |
| *D.B.a.* ... | 10 | Double Bottom, aft. See Illustration following KEY to REGISTER. |
| *D.B.f.* ... | 10 | Double bottom, forward. See Illustration following KEY to REGISTER. |
| *D.B. under E. & B.* | 10 | Double bottom under Engines and Boilers. See Illustration following KEY to REGISTER. |
| *dia.d.* ... | 2 | Bottom diagonally doubled with Wood. |
| *Dks.* ..... | 5 | Decks, with number prefixed thus, 2 *Dks.* |
| Dr. ..... | 2 | Dogger (rig). |
| Drp. ..... | 7 | Damage repairs to Ship. |
| D.R. | | Damage Repairs to Ship. |
| drp. | 7 | Damage repairs to Machinery. |
| | | E. |
| *e* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*e*) ..... | 7 | Shell of boiler made of steel ; stays, end plates, furnaces, and combustion chamber of iron. |
| *E.* ..... | 7 | Elm (timber). |
| E. ..... | 14 | See SYMBOLS OF CLASSIFICATION at the beginning of KEY to REGISTER. |
| Ex. ..... | | Experimental. |
| *Expl. B.S.* | 10 | Vessels built experimentally and classed subject to Biennial Survey. |
| *Expl. T.S.* | 10 | Vessels built experimentally and classed subject to Triennial Survey. |
| | | F. |
| *f*.. ..... | 13 | Equipment letter, as per Table No. 22. |
| (*f*) ..... | 7 | Shell of boiler made of iron ; stays, end plates, furnaces, and combustion chamber of steel. |
| F. .. ..... | 2 | Felt. |
| *F.* ... ..... | 7 | Fir (timber). |
| *F.* ..... | 5 | Forecastle. |
| *F.D.* ..... | 5 | Flush Deck. |
| *F.P.T.* ... | 10 | Fore Peak Tank. See Illustration following KEY to REGISTER. |
| F.&Y.M. | 2 | Sheathed with Yellow Metal over Felt. |
| F.S. ..... | 10 | Full Scantlings, carried to upper deck in three-decked Ships. |
| | | G. |
| *g*..... | 13 | Equipment letter, as per Table No. 22. |
| (*g*) ..... | 7 | Shell and end plates of boiler made of iron ; stays, furnaces, and combustion chamber of steel. |
| G. ..... | 2 | Galliot. |
| *G.* ..... | 7 | Gum (timber). |
| *Ght.* ... .. | 7 | Greenheart (timber). |
| G.I.B. ... | 2 | Fastened with Galvanised Iron Bolts. |

*A List of Surveying Ports will be found at the end of the* KEY TO REGISTER.

# KEY TO SYMBOLS AND ABBREVIATIONS—*continued.*

| Abbreviation or Sign. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| | | **H.** |
| *h* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*h*) ..... | 7 | Shell, end plates, furnaces, and combustion chamber of boiler made of iron ; stays of steel. |
| H. ..... | 2 | Hoy (rig). |
| H. ..... | 7 | Horizontal Engines. |
| *Hk.* ..... | 7 | Hackmatack (timber). |
| *Hm.* ..... | 7 | Hemlock (timber). |
| HP ..... | 7 | Horse Power, according to ship's official register. |
| H.T. ..... | 11 | Half Time or Intermediate Survey held. (Section 34.) |
| | | **I.** |
| *i*..... | 13 | Equipment Letter, as per Table No. 22. |
| (*i*) ... ..... | 7 | Shell, stays, end plates, furnaces, and combustion chamber of boiler made of iron. |
| I. ..... | 7 | Inverted Cylinders. |
| I.B. ..... | 2 | Fastened with Iron Bolts. |
| | | **J.** |
| *j*..... ... | 13 | Equipment letter, as per Table No. 22. |
| (*j*) ..... | 7 | Shell and stays of boiler made of iron ; remainder partly of steel, partly of iron. |
| *J.* ..... | 7 | Juniper (timber). |
| | | **K.** |
| *k* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*k*) ..... | 7 | Shell and stays of boiler made of steel ; remainder partly of steel, partly of iron. |
| K. ..... | 2 | Ketch. |
| | | **L.** |
| *l*..... | 13 | Equipment letter, as per Table No. 22. |
| (*l*) ..... | 7 | Shell of boiler made of steel; stays of iron ; remainder partly of steel, partly of iron. |
| *L.* ..... | 7 | Locust (timber). |
| *Lh.* ..... | 7 | Larch (timber). |
| *LO*..... | 7 | Live Oak (timber). |
| L. ..... | 7 | Lever Engines. |
| lb. ..... | 7 | (With figures prefixed). Boiler Pressure in pounds per square inch. |
| len. ..... | 7 | Ship lengthened. |
| LA.&CP. ... | 12 | Anchors and Chains proved at a Machine under the Superintendence of the Committee of LLOYD'S REGISTER. See Table No. 22. |

| Abbreviation or Sign. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| L.MC | 7or8 | Lloyd's Machinery Certificate, with date, denoting that the Machinery and Boilers are fitted in accordance with the Rules, and found at the time mentioned in good condition. |
| ✠L.MC | 7or8 | Special Survey of Machinery during construction by the Engineer-Surveyors to LLOYD'S REGISTER. |
| Lr. ..... | 2 | Lugger. |
| lrp. ..... | 7 | Large repairs to Hull of Ship. |
| lrp. | 7 | Large repairs to Machinery. |
| L.R. ..... | 10 | Large Repairs to Hull of Ship. |
| L.D.R. ... | 10 | Large Damage Repairs to Hull of Ship. |
| Lv..... | 13 | Classification of the Liverpool Underwriters' Registry. |
| | | **M.** |
| *m* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*m*)..... | 7 | Shell of boiler made of iron ; screw stays of steel ; longitudinal stays of iron ; remainder partly of steel, partly of iron. |
| *M.* ..... | 7 | Mahogany (timber). |
| MS. | 7or8 | Machinery Surveyed, with date, denoting that the Machinery, though not fitted strictly in accordance with the Rules, was found, on inspection at that time, to be in good condition. |
| *M.T.* ... .. | 10 | Midship deep Tank. See Illustration following KEY to REGISTER. |
| Mat. ..... | 7 | Materials, with number of years prefixed, indicates the different grades of Wood used in ship's construction, as per Table A |
| | | **N.** |
| *n* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*n*) ..... | 7 | Shell of boiler made of iron ; stays of steel ; remainder partly of steel, partly of iron. |
| N.B. ..... | 7 | New Bottom. |
| N.B. ..... | 7 | New Boilers. |
| ✠NB. | 7 | New Boilers specially Surveyed during construction. |
| N.D. ..... | 7 | New Deck. |
| N.E. ..... | 7 | New Engines. |
| N.E.&B. | 7 | New Engines and Boilers. |
| ✠NE&B | 7 | New Engines and Boilers, which have been *specially Surveyed* during construction. |
| NKl. ..... | 7 | New Keel. |
| NKlsn. ... | 7 | New Keelson. |
| NTsds. ... | 7 | New Topsides. |
| NW. ..... | 7 | New Wales. |
| | | **O.** |
| *o* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*o*) ..... | 7 | Shell, screw stays, end plates, furnaces, and combustion chamber of boiler made of steel ; longitudinal stays of iron. |
| O. ..... | 7 | Oscillating Cylinders. |
| *O.* ..... | 7 | Oak (timber). |
| O.M. ..... | 7 | Old materials used in ship's construction. |

*A List of Surveying Ports will be found at the end of the* KEY TO REGISTER.

# KEY TO SYMBOLS AND ABBREVIATIONS—*continued.*

| Sign or Abbreviation. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| | | **P.** |
| *p* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*p*)..... | 7 | Shell and longitudinal stays of boiler made of iron ; screw stays, end plates, furnaces and combustion chamber of steel. |
| *P.* ..... | 7 | Pine (timber). |
| P.B.H ... | 2 | Partial Bulkhead, or Bulkhead not reaching to the Main Deck. |
| *PP.* ..... | 7 | Pitch Pine (timber). |
| *P.* ..... | 5 | Poop Deck. |
| plk. ..... | 7 | Plank. |
| pt. ..... | 2 | Part. |
| ptOM. ... | 7 | Part Old Materials used in ship's construction. |
| Pad. ..... | 2 | Paddle Steamer. |
| | | **Q.** |
| *q*... ..... | 13 | Equipment letter, as per Table No. 22. |
| (*q*) ..... | 7 | Shell, longitudinal stays, end plates, furnaces, and combustion chamber of boiler made of iron ; screw stays of steel. |
| | | **R.** |
| *r* ..... | 13 | Equipment letter, as per Table No. 22. |
| (*r*) ..... | 7 | Shell, longitudinal stays, end plates, furnaces, and combustion chamber of boiler made of steel ; screw stays of iron. |
| Rest. ..... | 11 | Restored. Thus, Rest.*Lon.*85-5 yrs., denotes that the vessel was restored on the A character for 5 years from 1885, and that the Survey was held at London. |
| retrld. ... | 7 | Re-treenailed. |
| *Roof* ..... | 3 | Vessel built under a roof, as per Section 48 of Rules for Wood Ships. |
| *RP.* ..... | 7 | Red Pine (timber). |
| *R.Q.D.* ... | 5 | Raised Quarter Deck. |
| | | **S.** |
| *s*..... | 13 | Equipment letter, as per Table No. 22. |
| (*s*) ..... | 7 | Shell, stays, end plates, furnaces, and combustion chamber of boiler made of steel. |
| s. ..... | 2 | Sheathed with Wood. |
| *S.* ... ..... | 7 | Spruce (timber). |
| *Sb.* ..... | 7 | Sabicu (timber). |
| *Sl.* ..... | 7 | Saul (timber). |
| *Salted* ... | 3 | Vessels salted in accordance with Rules. Section 37. |
| *Salted*† ... | 3 | The dagger signifies that the vessel's beams have *not* been salted. |
| S. ..... | 2 | Ship. |
| Scw. ..... | 2 | Screw. |
| Stm. ..... | 2 | Steamer. |
| Sk..... | 2 | Smack. |
| Sp. ..... | 2 | Sloop. |
| Sq. ..... | 2 | Square Rigged. |
| Sr. ..... | 2 | Schooner. |
| Sw. ..... | 2 | Snow. |
| s.c. ..... | 7 | Surface condensing. |
| *Spar dk.* | 5 | Built according to Rules for Spar-Decked Vessels. Section 42. |
| srp. ... .. | 7 | Some repairs to Hull of ship. |
| *s.s.* ..... | 10 & 11 | Special Survey of Iron or Steel ships. Vessels submitted to Periodical Surveys, as prescribed in the Rules for Iron Ships (thus, *s.s.*Nwc. *No.*1-85 ; *s.s.* Hull. *No.*2-85 ; *s.s.*Lon. *No.*3-85). |
| S.S. ..... | 11 | Special Survey of Composite ships, with date, as per Section 43 of the Rules. |
| S.S. ..... | 10 & 11 | Special Survey of Wood ships classed Æ or E, with the term of years granted them, and the year of Survey, as per Sections 61, 63, and 65 of Rules for Wood Ships (thus, SS. Whn.85-4yrs.). |
| S. S. | 11 & 12 | Special Survey. Date in red affixed denotes that the vessel has been surveyed at that time in accordance with the Rules for Wood Ships, Section 60, and the number of years indicates the term for which the vessel remains on this character (thus, S.S.Sld.85-5yrs ) |
| | | **T.** |
| *t*..... | 13 | Equipment letter, as per Table No. 22. |
| (*t*) ..... | 7 | Shell, screw stays, end plates, furnaces, and combustion chamber of boiler made of iron ; longitudinal stays of steel. |
| *T.* ..... | 7 | Teak (timber). |
| *Tam.*..... | 7 | Tamarac (timber). |
| *tr.B.* ..... | 5 | Tiers of Beams with number of same prefixed (thus 3*tr. B.*). |
| *t.s.* ..... | 10 | With a date denotes that the vessel has been submitted to Triennial Survey, as prescribed by Rules for Iron Ships (thus, "*t.s.* 85"). |
| Tta. ... .. | 10 | Trimming Tank aft. |
| Ttf. ..... | 10 | Trimming Tank forward. |
| | | **U.** |
| *u* ..... | 13 | Equipment letter, as per Table No. 22. |
| U.M. ..... | 2 | Sheathed with Union Metal. |
| | | **V.** |
| *v*..... | 13 | Equipment letter, as per Table No. 22. |
| | | **W.** |
| *w* ..... | 13 | Equipment letter, as per Table No. 22. |
| *WO.* ..... | 7 | White Oak (timber). |
| w.s. ..... | 7 | Wales sheathed with wood. |
| WBCaf ... | 10 | Vessel fitted with a Water Ballast Compartment both before and abaft the Engine and Boiler space. |
| WBTtaf | 10 | Trimming Tank at each end of the vessel. |
| WBafeb... | 10 | Water Ballast is fitted all fore and aft. |
| WBb ..... | 10 | Water Ballast fitted under the Boilers only. |
| WBlong. con. | 10 | Water Ballast, longitudinal construction. |

*A List of Surveying Ports will be found at the end of the* KEY TO REGISTER.

# KEY TO SYMBOLS AND ABBREVIATIONS--*continued.*

| Sign or Abbreviation. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| | | X. |
| *x*..... | 13 | Equipment letter, as per Table No. 22. |
| | | Y. |
| *y* ..... | 13 | Equipment letter, as per Table No. 22. |
| Y.M..... | 2 | Sheathed with Yellow Metal. |
| *YP.* ..... | 7 | Yellow Pine (timber). |
| Yt..... | 2 | Yacht. |
| | | Z. |
| *z*..... | 13 | Equipment letter, as per Table No. 22. |
| Z ..... | 2 | Sheathed with Zinc. |
| | | SIGNS, &c. |
| ✠ | 1,13 | Ships built under Special Survey. |
| ✠ | 8 | Machinery built under Special Survey. |
| ✠NE&B. | 7 | New Engines and Boilers built under Special Survey. |

| Sign or Abbreviation. | No. of Col. in Register Book. | Signification. |
|---|---|---|
| † | 3 | Following word *salted* signifies that the vessel's beams have *not* been salted. |
| 5,85 | 14 | Vessel at date mentioned, from reported defects, was not entitled to a character in Register Book. |
| 3.85 | 14 | Vessel's class withdrawn from non-compliance at date mentioned with the Society's Rules. |
| ... | 13 | Vessel's class withdrawn at Owner's request. |
| — (after character) | 14 | Equipment of vessel deficient either in quality or quantity. |
| 1 | 14 | The figure 1 placed after a character signifies that the vessel is well and sufficiently equipped, as per Table No. 22. |
| Φ | 14 | A black ring over the figure 1 indicates defects in Masts or Rigging imperilling the ship's safety. |
| Φ | 14 | A red ring over the figure 1 indicates defects in Engines or Boilers of a steam ship imperilling the ship's safety. |
| 2 or 3 *Dks* | 5 | Two or three Decks laid. |
| 2 or 3 *trB.* | 5 | Two or three tiers of Beams, with or without Decks on them. |
| 3 *decked-rule* | 5 | Built according to the Rules for Three-Decked Vessels, Section 41. |

The Figures under a Character denote the date when the Vessel was last Surveyed.

*When printed in red (except in the case of Vessels classed* A 1 *in red) they indicate that the Survey has reference to the Stores only.*

*The twelfth, thirteenth, and fourteenth Columns left blank, indicate that the Vessel has never been Classed in the Register Book.*

The Figures in the thirteenth column, to vessels in the classes A in red, Æ or E class, imply that they were originally classed A, for that number of years.

When the fourteenth column is left blank except as regards the date of Survey last recorded, it indicates that the Character has expired or been withdrawn from absence of Survey, or on account of non-payment of fee due in the case.

The figures recorded in the fifteenth column represent the mean drafts corresponding to an immersion of 65, 70, 75, and 80 per cent. respectively, but these drafts do not indicate approved load lines.

# KEY TO ABBREVIATIONS.

## Illustrations of Notations *in the Tenth Column* of the Register Book, in regard to Double Bottoms and Water Ballast Tanks:—

*DB.70ft.80tons: denoting Double Bottom 70 feet long; capacity, 80 tons.*

*DB.a.58ft.f.40ft.180tons: denoting Double Bottom, aft 58 feet, forward 40 feet long; capacity 180 tons.*

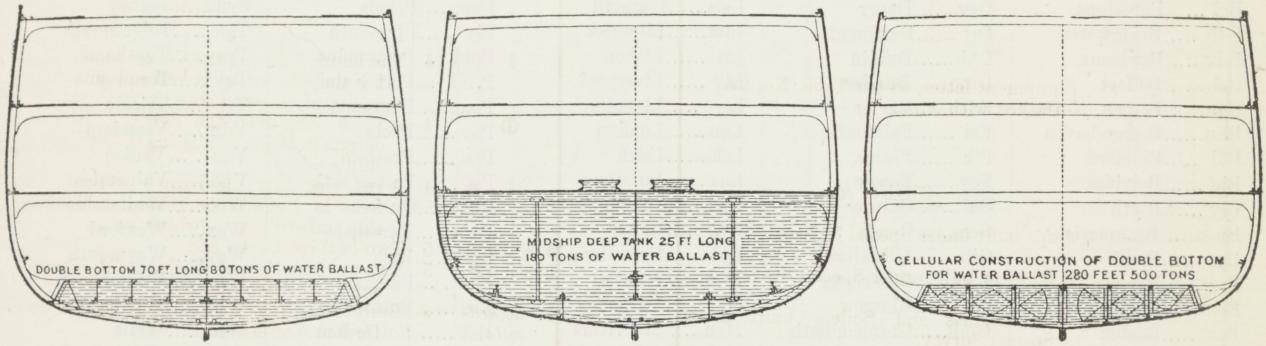
*DB.a.72ft.&underE.&B.28ft.260tons: denoting Double Bottom aft 72 feet long, and under Engines and Boilers 28 feet long; capacity, 260 tons.*

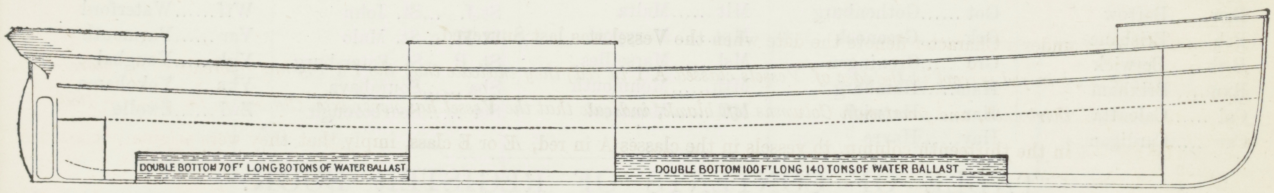
*Cell.DB.280ft.500tons: denoting cellular construction of Double Bottom 280 feet long; capacity, 500 tons.*

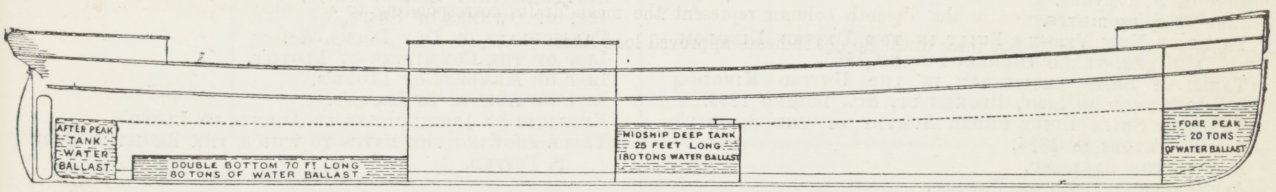
*F.P.T.20tons: denoting Fore Peak Tank; capacity, 20 tons.*

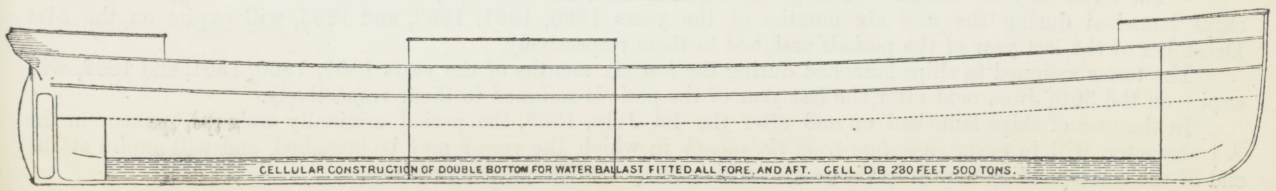
*A.P.T.8tons: denoting After Peak Tank; capacity, 8 tons.*

*M.T.25ft.180tons: denoting Midship deep Tank, 25 feet long; capacity, 180 tons.* (*See* Diagrams.)



# KEY TO ABBREVIATIONS OF SURVEYING PORTS.

*In the Twelfth Column.*

Abn.....Aberdeen
Abr.....Aberayron
Abs.....Aberystwith
Adl.....Adelaide
Akb.....Akyab
All .....Alloa
Ams.....Amsterdam
Amy.....Amoy
Anc.....Ancona
Ant.....Antwerp
Apl.....Appledore
Arb..... Arbroath
Auk.....Auckland, N.Z.
Bal .....Baltimore
Bar .....Barmouth
B.As ...Buenos Ayres
Bat .....Batavia
Bbo.....Bilbao
Bcl ..... Barcelona
Bdg.....Bridgwater
Bdx.....Bordeaux
Bel .....Belfast
Bgn.....Bergen, Norway
Bhn.....Bremerhaven
Bid .....Bideford
Blg .....Belgium
Bly .....Blyth
Bms.....Beaumaris
Bnf .....Banff
Bng.....Bangor
Bom.....Bombay
Bos .....Boston
Bpl .....Barnstaple
Bpt .....Bridport
Brs .....Bristol
Brw.....Barrow
Bsb .....Brisbane
Bwk.....Berwick
Bxm.....Brixham
Cal .....Calcutta
Car .....Cardigan
Cbn.....Cheribon
Cch .....Christchurch
Cdz .....Cadiz
Cff .....Cardiff
Chp.....Chepstow
Chs .....Chester
Cly ... {Clyde, Glasgow, &c.
Cpl .....Constantinople
Cpn.....Copenhagen
Crk .....Cork
Cst.....Cronstadt
C.Tn ...Cape Town
Cws.....Cowes
Ddn.....Dunedin, N.Z.
Dem.....Demerara
Dgr.....Dungarvon
Dmb.....Dumbarton
Dov.....Dover
Drt .....Dartmouth
Dub.....Dublin
Dun.....Dundee
Exr .....Exeter
Fal .....Falmouth
Fiu .....Fiume
Foy .....Fowey
Gal .....Galway
Gen.....Genoa
Gib .....Gibraltar
Glr .....Gloucester
Gls .....Glasgow
Gmh.....Grangemouth
Gms.....Grimsby
Gns.....Guernsey
Goo .....Goole
Got .....Gothenburg
Grk .....Greenock
Gro .....Groningen
Ham.....Hamburg
Har.....Harwich
Hav.....Havre
Hay.....Hayle
Hbt.....Hobart
Hfs.....Helsingfors
Hgt.....Harrington
Hgz.....Hoogezand
H.Kg ...Hong Kong
Hol.....Holland
Hpl.....Hartlepool
Hrl .....Harlingen
Hul.....Hull
I.M.....Isle of Man
Inv .....Inverness
Ips .....Ipswich
Jer ... ..Jersey
Kgn.....Kingston, Jam
Krh.....Kurrachee
Lan.. ...Lancaster
Ldy..... Londonderry
Lgn.....Leghorn
Lim.....Limerick
Lis .....Lisbon
Liv .....Liverpool
Lly .....Llanelly
Lon.....London
Lth.....Leith
Lus .....Lussino
Lwt.....Lowestoft
Lyn.....Lynn
Lyt.....Lyttelton, N.Z.
Man.....Manila
Mar.....Margate
Mau.....Mauritius
Mch.....Miramichi
Mel .....Melbourne
Mil .....Milford
Mlt .....Malta
Mpt.....Maryport
Msl .....Marseilles
Mth.....Monmouth
Mtl .....Montreal
Mtr.....Montrose
Nap.....Naples
Ndp.....Nieuwe Diep
Nhv. ....Newhaven
Npt.....Newport
Nqy... {Newquay, Cardiganshire
Nry.....Newry
N.Sc.....Nova Scotia
Nts .....Nantes
Nwc.....Newcastle
N.Yk ...New York
Ork . ....Orkneys
Pad .....Padstow
P.E.I. {Prince Edward Island
Pet .....Peterhead
Phl .....Philadelphia
Pka.....Pekela
Ply .....Plymouth
Pmd ...Portmadoc
P.Nl. ...Port Natal
Pnz .....Penzance
Poo .....Poole
Prs .....Preston
Pts .....Portsmouth
Qbc.....Quebec
Ram.....Ramsgate
Rga .....Riga
Rgn.. ...Rangoon
Ros .....Rostock
Rot .....Rotterdam
Rou.....Rouen
S.Fo.....San Francisco
St.I. ...St. Ives
St.J. ...St. John
St.M. ...St. Malo
St. P ...St. Petersburg
Sba .....Sourabaya
Scr .....Scarborough
Shi .....Shanghai
Shl ... {Shields, N. Shields, S.
Shm.....Shoreham
Sil .....Scilly
Sld .....Sunderland
Sli .....Sligo
Sly .....Sicily
Smg.....Samarang
Sng.....Singapore
Sou .....Southampton
Spl .....Sebastopol
Spr .....Sappemeer
Stk..... Stockton
Stn .....Stettin
Str ... . Stranraer
Sty .....Stornoway
Sws.....Swansea
Syd.....Sydney
Tgn... .Teignmouth
Tps .....Topsham
Tqy.....Torquay
Tri .....Trieste
Vdm.....Veendam
Ven.. ...Venice
Vpo.....Valparaiso
Wbl.....Whitstable
Wex.....Wexford
Wey.....Weymouth
Whn.....Whitehaven
Wln.....Wellington
Wls. ....Wells
Wlv.. ...Wildervank
Wrk.....Workington
Wtb.....Whitby
Wtf.....Waterford
Yar .....Yarmouth
Ygh.....Youghal
Yka.....Yokohama
Zwl .....Zwolle

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## EXPIRATION OF CLASS OF WOOD SHIPS.—EXTRACT FROM SECTION 59 OF THE RULES.

* The terms of years assigned to ships on the Character A, launched *previously to the 1st July*, 1859, also of ships launched during the *first* six months of the years 1860, 1861, 1862, and 1863, will expire on the 31st December of the last year of the periods assigned to them respectively.

The terms assigned to ships launched during the *last* six months of the years 1859, 1860, 1861, and 1862, will expire on the 30th June next after the last year of the periods assigned to them respectively.

In the case of ships launched on and after the 1st July, 1863, the period originally assigned to them on the A 1 character, will in every case *date from the month* in which the vessel may be launched, and will expire at the end of the corresponding month in the year at which the period assigned terminates.

ATEMENT showing the Number, Tonnage, and Description of New Vessels Classed by Lloyd's Register of British and Foreign Shipping during the Year 1885.

| HERE BUILT. | STEEL. | | | | IRON. | | | | WOOD. | | | | TOTAL. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STEAM. | | SAILING. | | STEAM. | | SAILING. | | STEAM. | | SAILING. | | | |
| | NO. | TONS. | NO. | TONS. | NO. | TONS. | NO. | TONS. | NO. | TONS. | NO. | TONS. | NO. | TONS. |
| ITED KINGDOM | 85 | 124,337 | 26 | 31,884 | 131 | 132,375 | 117 | 160,296 | 14 | 762 | 90 | 8,349 | 463 | 458,003 |
| LONIES ..... | ... | ..... | ... | ..... | ... | ..... | ... | ..... | 2 | 788 | 10 | 3,266 | 12 | 4,054 |
| ITED STATES... | ... | ..... | ... | ..... | 1 | 2,098 | ... | ..... | ... | ..... | ... | ..... | 1 | 2,098 |
| RMANY ..... | 1 | 568 | 1 | 333 | 5 | 2,625 | 1 | 1,231 | ... | ..... | 15 | 1,209 | 23 | 5,966 |
| LY..... | 1 | 3,839 | ... | ..... | ... | ..... | ... | ..... | ... | ..... | ... | ..... | 1 | 3,839 |
| LLAND ..... | 1 | 649 | ... | ..... | 1 | 1,259 | 1 | 414 | ... | ..... | ... | ..... | 3 | 2,322 |
| RWAY ..... | ... | ..... | ... | ..... | 2 | 1,977 | 1 | 541 | ... | ..... | ... | ..... | 3 | 2,518 |
| EDEN..... | 1 | 431 | ... | ..... | 2 | 1,009 | ... | ..... | ... | ..... | ... | ..... | 3 | 1,440 |
| | 89 | 129,824 | 27 | 32,217 | 142 | 141,343 | 120 | 162,482 | 16 | 1,550 | 115 | 12,824 | 509 | 480,240 |

## SUMMARY.

| | STEEL. | | IRON. | | WOOD. | | TOTAL. | |
|---|---|---|---|---|---|---|---|---|
| | NO. | TONNAGE (GROSS). | NO. | TONNAGE (GROSS). | NO. | TONNAGE (GROSS). | NO. | TONNAGE (GROSS). |
| EAM VESSELS ... | 89 | 129,824 | 142 | 141,343 | 16 | 1,550 | 247 | 272,717 |
| ILING VESSELS... | 27 | 32,217 | 120 | 162,482 | 115 | 12,824 | 262 | 207,523 |
| Total... | 116 | 162,041 | 262 | 303,825 | 131 | 14,374 | 509 | 480,240 |

Total Number of NEW VESSELS CLASSED by the Society during the year 1885 :—**509** Vessels of **480,240** Tons.

D'S REGISTER OF SHIPPING,
*6th January*, 1886.

## STATEMENT of the Number, Tonnage, and Description of New Vessels Built in the United Kingdom and Registered therein during the Year 1885.

*(Prepared from information supplied by the Registrar General of Shipping.)*

| 1885. | STEEL. | | | | IRON. | | | | WOOD. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STEAM. | | SAILING. | | STEAM. | | SAILING. | | STEAM. | | SAILING. | |
| | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). |
| JANUARY | 8 | 16,475 | ... | ... | 9 | 10,451 | 8 | 7,252 | 3 | 96 | 14 | 96 |
| FEBRUARY | 4 | 1,933 | 2 | 2,799 | 13 | 9,556 | 14 | 15,323 | 2 | 885 | 21 | 1,47 |
| MARCH | 9 | 12,207 | 2 | 2,070 | 24 | 21,665 | 13 | 15,002 | 3 | 136 | 19 | 1,25 |
| APRIL | 7 | 9,067 | 1 | 1,470 | 14 | 16,067 | 10 | 12,087 | 3 | 182 | 29 | 1,68 |
| MAY | 12 | 9,812 | 4 | 3,731 | 21 | 15,990 | 13 | 16,188 | 3 | 70 | 18 | 1,12 |
| JUNE | 16 | 16,736 | 2 | 1,465 | 16 | 8,295 | 18 | 17,650 | 6 | 297 | 23 | 1,28 |
| JULY | 15 | 18,279 | 2 | 3,215 | 16 | 14,574 | 13 | 15,627 | 2 | 92 | 35 | 2,52 |
| AUGUST | 7 | 7,914 | 2 | 3,597 | 12 | 9,652 | 13 | 16,924 | 4 | 144 | 20 | 1,24 |
| SEPTEMBER | 13 | 15,710 | 4 | 3,848 | 17 | 8,034 | 14 | 12,000 | 1 | 107 | 16 | 1,12 |
| OCTOBER | 9 | 16,349 | 3 | 1,762 | 13 | 11,977 | 11 | 12,490 | 3 | 226 | 29 | 2,13 |
| NOVEMBER | 12 | 11,469 | 3 | 3,355 | 17 | 16,348 | 11 | 10,843 | 3 | 159 | 25 | 1,74 |
| DECEMBER | 10 | 18,298 | 2 | 3,257 | 5 | 5,899 | 6 | 8,648 | 4 | 357 | 17 | 1,27 |
| | 122 | 154,249 | 27 | 30,569 | 177 | 148,508 | 144 | 160,034 | 37 | 2,751 | 266 | 17,84 |

## SUMMARY.

| | STEEL. | | IRON. | | WOOD. | | TOTAL. | |
|---|---|---|---|---|---|---|---|---|
| | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). |
| STEAM VESSELS | 122 | 154,249 | 177 | 148,508 | 37 | 2,751 | 336 | 305,50 |
| SAILING VESSELS | 27 | 30,569 | 144 | 160,034 | 266 | 17,841 | 437 | 208,44 |
| Total | 149 | 184,818 | 321 | 308,542 | 303 | 20,592 | 773 | 513,95 |

The above Statements show that while there were **735** more Vessels Lost, &c., belonging to the United Kin

LLOYD'S REGISTER OF SHIPPING,
*6th January*, 1886.

TEMENT of the Number, Tonnage, and Description of Vessels Registered in the United Kingdom which were returned as Lost, Broken up, &c., during the Year 1885.

*(Prepared from information supplied by the Registrar General of Shipping.)*

| 1885. | STEEL. | | | | IRON. | | | | WOOD. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STEAM. | | SAILING. | | STEAM. | | SAILING. | | STEAM. | | SAILING. | |
| | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). |
| NUARY | ... | ..... | ... | ..... | 10 | 11,623 | 5 | 5,472 | 1 | 84 | 46 | 5,062 |
| BRUARY | 1 | 1,615 | ... | ..... | 13 | 10,521 | 6 | 3,608 | 1 | 72 | 58 | 9,245 |
| ARCH | ... | ..... | ... | ..... | 15 | 16,505 | 3 | 3,026 | 2 | 127 | 97 | 7,169 |
| RIL | ... | ..... | ... | ..... | 23 | 21,539 | 1 | 941 | 9 | 602 | 166 | 15,606 |
| AY | 3 | 3,788 | ... | ..... | 10 | 5,335 | 6 | 1,867 | 10 | 665 | 188 | 17,083 |
| NE | ... | ..... | ... | ..... | 14 | 19,244 | 5 | 2,655 | 12 | 937 | 121 | 9,973 |
| LY | ... | ..... | ... | ..... | 18 | 18,384 | 4 | 2,164 | 6 | 199 | 133 | 13,921 |
| GUST | 1 | 1,816 | ... | ..... | 9 | 10,759 | 7 | 8,776 | 4 | 1,202 | 84 | 6,775 |
| PTEMBER | ... | ..... | ... | ..... | 9 | 9,093 | 7 | 10,205 | 4 | 588 | 75 | 7,908 |
| TOBER | 1 | 1,161 | ... | ..... | 16 | 14,459 | 4 | 5,251 | 5 | 279 | 58 | 5,011 |
| VEMBER | ... | ..... | ... | ..... | 14 | 13,338 | 4 | 3,962 | 4 | 828 | 75 | 14,730 |
| CEMBER | ... | ..... | ... | ..... | 21 | 20,054 | 1 | 1,523 | 4 | 119 | 114 | 13,657 |
| | 6 | 8,380 | ... | ..... | 172 | 170,854 | 53 | 49,450 | 62 | 5,702 | 1215 | 126,140 |

## SUMMARY.

| | STEEL. | | IRON. | | WOOD. | | TOTAL. | |
|---|---|---|---|---|---|---|---|---|
| | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). | NO. | TONS (GROSS). |
| EAM VESSELS ..... | 6 | 8,380 | 172 | 170,854 | 62 | 5,702 | 240 | 184,936 |
| ILING VESSELS ..... | ... | ..... | 53 | 49,450 | 1,215 | 126,140 | 1,268 | 175,590 |
| Total..... | 6 | 8,380 | 225 | 220,304 | 1,277 | 131,842 | 1,508 | 360,526 |

were built therein during the year 1885, *the Tonnage of those Built exceeded that of those Lost by* **153,426** *tons.*